

CHARLES / MGH STATION



Design Summary Report

Massachusetts Bay Transportation Authority Project

Charles/MGH Red Line Station Accessibility and Modernization



August 31, 2000

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ARCHITECTS LTD HDR



Table of Contents

Executive Summary	4
Background	7
Project Goals	9
Design Competition	11
Existing Conditions	13
Local Area Developments	26
Traffic Options Methodology	27
Station Location Methodology	29
Project Options / Potential Alternatives	30
Development of Three Options	55
Conclusion	63
Index	64

Executive Summary

Elkus / Manfredi Architects Ltd – HDR, A Joint Venture Team, is pleased to present in this draft “Design Summary Report” the conclusions of a five-month study of the Charles/MGH Red Line Station. Project goals are to make the station ADA compliant, accomplish safe pedestrian, barrier-free access to the station and platforms, modernize the station to be customer friendly, operate optimally, portray an appropriate image as a gateway to Cambridge/Boston and consider the future development of Massachusetts General Hospital.

Information Gathering

Preliminary information gathering led to the review of archival drawings of the Longfellow Bridge, the Charles Circle MDC roadway, viaduct construction, original station construction and subsequent improvement drawings, including the platform extension in the 1980’s. Team members and consultants met on site for a preliminary assessment of the existing condition of the station, structure, piers and viaduct, track, signals and power. The MBTA hosted a presentation of the “ideas” competition, held in 1998 to generate community input for a renewed Charles/MGH station.

Urban Context

Presented in its context, the station can be considered at regional, neighborhood and station district scales. As a regional facility, Charles/MGH station acts as an entry or “gateway” from Cambridge to Boston, a destination for highly visible Esplanade events, a transportation key station, particularly, to

world-renowned medical institutions. While the station punctuates the landmark Longfellow Bridge, many pedestrians also walk past the station while enjoying the Esplanade, and Harborwalk.

At the neighborhood scale, Charles/MGH is within walking distance, not only, of Beacon Hill, but also, of Charlesbank, City Hall, the Boston Common and the Public Garden. The station district encompasses the commercial areas of Cambridge Street, institutional uses, mostly to the north and the dense residential district of Beacon Hill.

Pedestrian / Vehicular Circulation

Investigations of traffic and pedestrian circulation at the station and Charles Circle revealed significant conflicts. The project team undertook traffic modeling of existing conditions, pedestrian origin and destination surveys, and automatic traffic recorder counts to verify and confirm visual observations.

Meetings / Dialogue

Meetings with the MBTA partners, MDC, MGH, MEEI, BRA and BTB, were held regularly to create a dialogue over the past, present and future developments around Charles/MGH Station. The partners lend a realistic outlook to the process, while representing their interests. Two public meetings were advertised and held at the Shriner’s Burn Institute, on Blossom Street. The first held on March 13, 2000, introduced the project team, who presented a general analysis of the project area. Traffic and station access prefer-

ences, such as underground, at-grade, or above grade, were examined. By the second public meeting, held on May 9, 2000, the team was able to present station variations discovered in the analysis. In September a third public meeting is planned to review the selected station option with the neighboring community. At this meeting the future public review process will be discussed and general project milestone dates will be reviewed.

Project Alternatives

Station options ranged from a new or rehabbed station at the existing site, a new station sited on a newly defined island created by modifying roadways, and a new station sited on an empty lot below the existing viaduct at the corner of West Cedar Street and Lindall Place. All were considered with varying circulation elements - underground, at-grade or above-grade pedestrian bridges.

Options

From the options, three were selected for further study:

- ⦿ Option A1.2, Major rehabilitation to station at existing location with pedestrian bridge access
- ⦿ Option B2.0 New station at enlarged Cambridge Street island with at-grade access
- ⦿ Option C1.2 New station at West Cedar Street with bridge access to MGH/MEEI district area

Option A1.2, Major rehabilitation to station at existing location with pedestrian bridge access

Option A is a redesign of the station on the existing site, approached from the perimeter of Charles Circle from new headhouses at the north and south sides. New glass enclosed, truss-type pedestrian bridges, connect to the existing mezzanine level, where the pay plaza is located.

- New version of the old station has many of the same functional problems as the existing station
- Difficult to phase and construct
- Value for the dollar spent is low
- Program areas remain cramped due to site and track structure limits

Option B2.0 New station at enlarged Cambridge Street Island with at-grade access

Option B considers a redesigned traffic scheme for Charles Circle as its starting point. By revising traffic patterns, an enlarged “island” can be carved out, creating an at-grade pedestrian crossing to the station headhouse.

- At-grade access to station greatly improves pedestrian understanding of the station
- Links station to neighborhood
- Improves security and user-friendliness

- Expanded program areas increase safety and function during events
- Roadway changes required to develop station site provide a more functional intersection
- Ease of construction and phasing allows existing station to remain unaffected during most of construction process

• High value of improvement for money spent

Option C1.2 New station at West Cedar Street with bridge access to MGH/MEEI district area

Option C is presented as an opportunity to complete the Cambridge Street edge by siting the station on the lot where the elevated Red Line tracks cut through from Cambridge Street towards the portal. A new station addresses neighborhood context and solves pedestrian access to the station.

- Infills street frontage at Cambridge Street
- Improves security at West Cedar Street as a public function – reduces homeless gathering space
- Retail areas complete street frontage
- Possible pedestrian bridge connection to MGH's future campus entry
- Station is part of Beacon Hill, not an island in the intersection

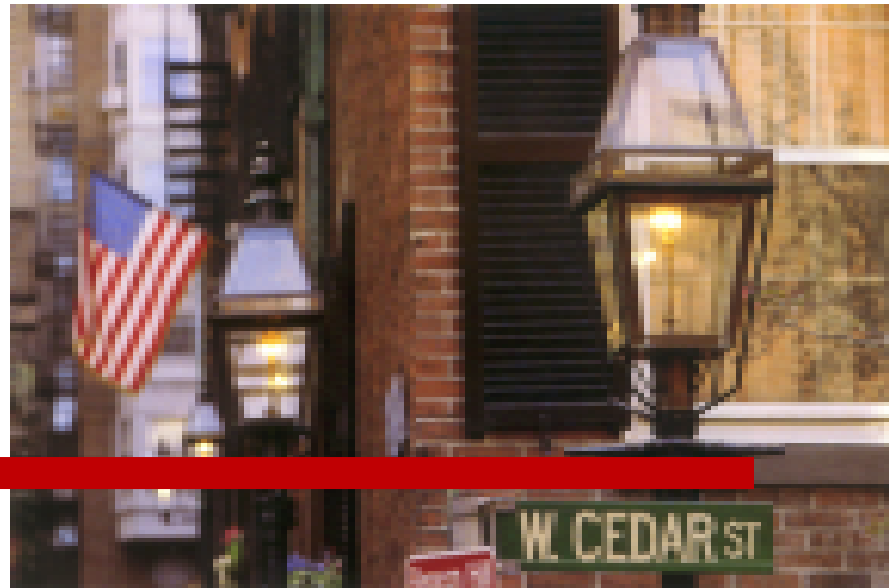
- Future traffic changes easier without station in intersection
- Total costs exceed project budget

Conclusion

While all three options selected for additional consideration satisfy the project goals, they, nonetheless, have different costs, values, schedules and phasing concerns. The Design Report is intended to be used as a starting point for additional dialogue among all participants, the MBTA, the partners, and the community, leading to a consensus for proceeding with the new Charles/MGH Station.

Elkus / Manfredi Architects Ltd – HDR, A Joint Venture Team, recommends Option B2.0 New station at enlarged Cambridge Street Island with at-grade access - as the best solution of the options. This option has the highest value for the cost. It will be the easiest to construct, and it will be the least disruptive to transportation services for the T to build.





Constructed in 1931 and 1932, the Charles/MGH Station was designed around the existing Red Line elevated track built in 1912. The station was built on a traffic island with an underground passageway to eliminate pedestrian access to the station from the traffic circle. The stairway from the underground tunnel arrived outside the station on the traffic island. A fare collection area was on the ground floor, followed by several flights of stairs to arrive at the elevated Red Line track platforms.

In later years, the Metropolitan District Commission (MDC) modified the traffic circle with the addition of more roadways that separated pedestrian access from the tunnel to the station. As a result, overhead walkways built in 1961 (and owned by the MDC) from the north and south sides of the traffic island, replaced the underground passageway. A new fare collection location area was built by the MBTA on a mezzanine between the ground floor and the elevated platform. The ground level fare collection area was closed to the public to prevent commuters from attempting to access the station at grade.

Since the 1961 modifications, the conflicts between pedestrians and vehicles have continued to increase in Charles Circle. Adding to this conflict are the interests of the major abutters in the district. Additionally, Beacon Hill has become a landmark destination year round for

locals and tourists alike. Events at the Esplanade draw large crowds of locals and tourists to the area. Recognized as a worldwide medical resource, Massachusetts General Hospital (MGH) and the other nearby institutions have continued to expand their presence adjacent to Charles/MGH station. The station's proximity to the MGH campus creates an expectation of a direct accessible connection between the hospitals and the station.

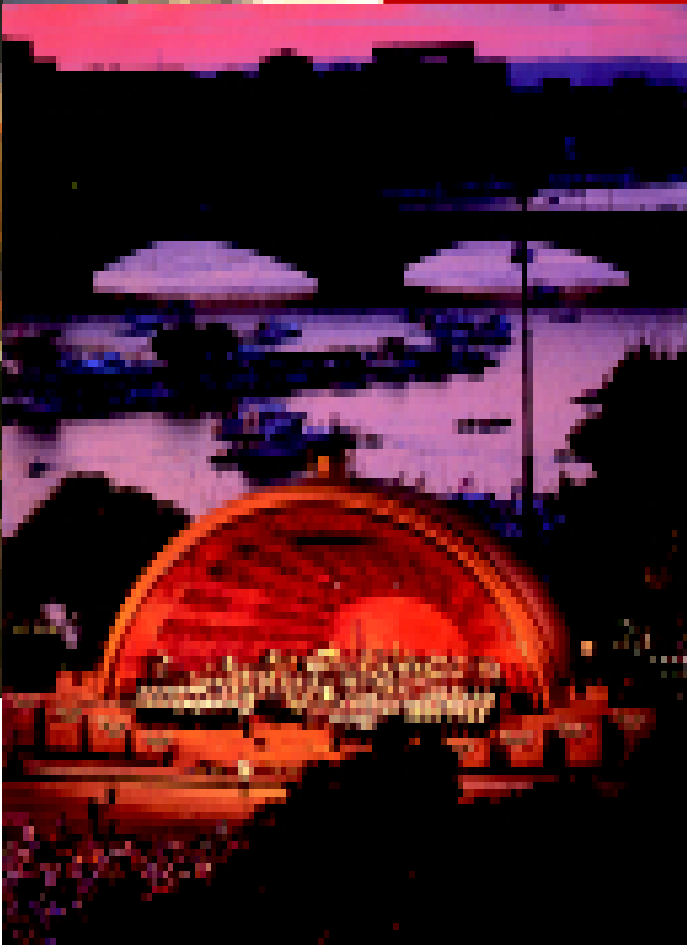
The advent of ADA legislation has required designers and transit authorities to carefully focus on issues of access in the planning and modernization of facilities. Site factors at this station offer significant challenges to meeting this mandate and would include improvements to facilities owned and operated by the MDC and the City of Boston. The history of this station, the changes taking place in and around the station district and the focus of this area as a local and national resource call into question the existing station's image and its core ability to functionally meet current and future expectations.

For several years the MBTA has been carefully studying the needs and the problems of the station and the district to provide a comprehensive understanding of the improvements needed at the station, in addition to the issues related to accessibility. The review included a national "Open Ideas Competition of Design", access and traffic

Background



studies, and numerous grassroots meetings with the community. As a result of this extensive review, the MBTA has undertaken a accessibility and modernization program to make the Charles/MGH Station comply with the Americans with Disabilities Act (ADA) of 1990, along with accomplishing safe pedestrian, barrier-free access to the station and each platform. The project intends to achieve in the modernization or replacement of the 67 year old station to be customer friendly, operate optimally, portray an appropriate image as a gateway to Cambridge/Boston, and consider the future development at MGH.



Project Goals

The purpose of this report is to review the major issues involved in determining the final concept for achieving these goals and improving the station and the station district.

This comprehensive evaluation and modernization of the Charles/MGH Station offers a unique opportunity to re-define this gateway to the City of Boston. The Charles Station district which has suffered from several decades of neglect now looks forward to development of the historic Charles Street Jail, the expansion and renovation of the MGH/MEEI campus, major public and governmental projects on Cambridge Street, and a civic rededication to the Charles River Basin. Recognizing the importance of the station to the district, the MBTA has established a dialog with all members of the community for a complete perspective of project goals and objectives.

ADA Access Compliance

In late 1989 and early 1990s, the Massachusetts Bay Transportation Authority (MBTA) developed an approved Key Station Plan as a first step in carrying out its obligations under the Americans with Disabilities Act of 1990 (ADA). ADA, Title II-Public Services, requires public transportation systems not to discriminate against persons with disabilities.

The Federal Transit Administration rule establishes the specific requirements for developing a key station plan, which include working with the community of people who have disabilities to determine key stations, based on listed criteria, as well as system-wide program accessibility.

The American with Disabilities Act of 1990 also included accessibility guidelines (ADAAG) for the design of transportation so that they are usable by people with disabilities. The guidelines, in conjunction with current State Access Board Regulations, cite the need for accessible routes to and from accessible entrances to stations and

boarding platforms used by the public. The accessible paths should coincide with the path used by the general public. Elements for future connections should also be on an accessible route.

The resulting design changes inspired by compliance with the ADA mandate has increased the general accessibility of transit structures to a broad range of the traveling public.

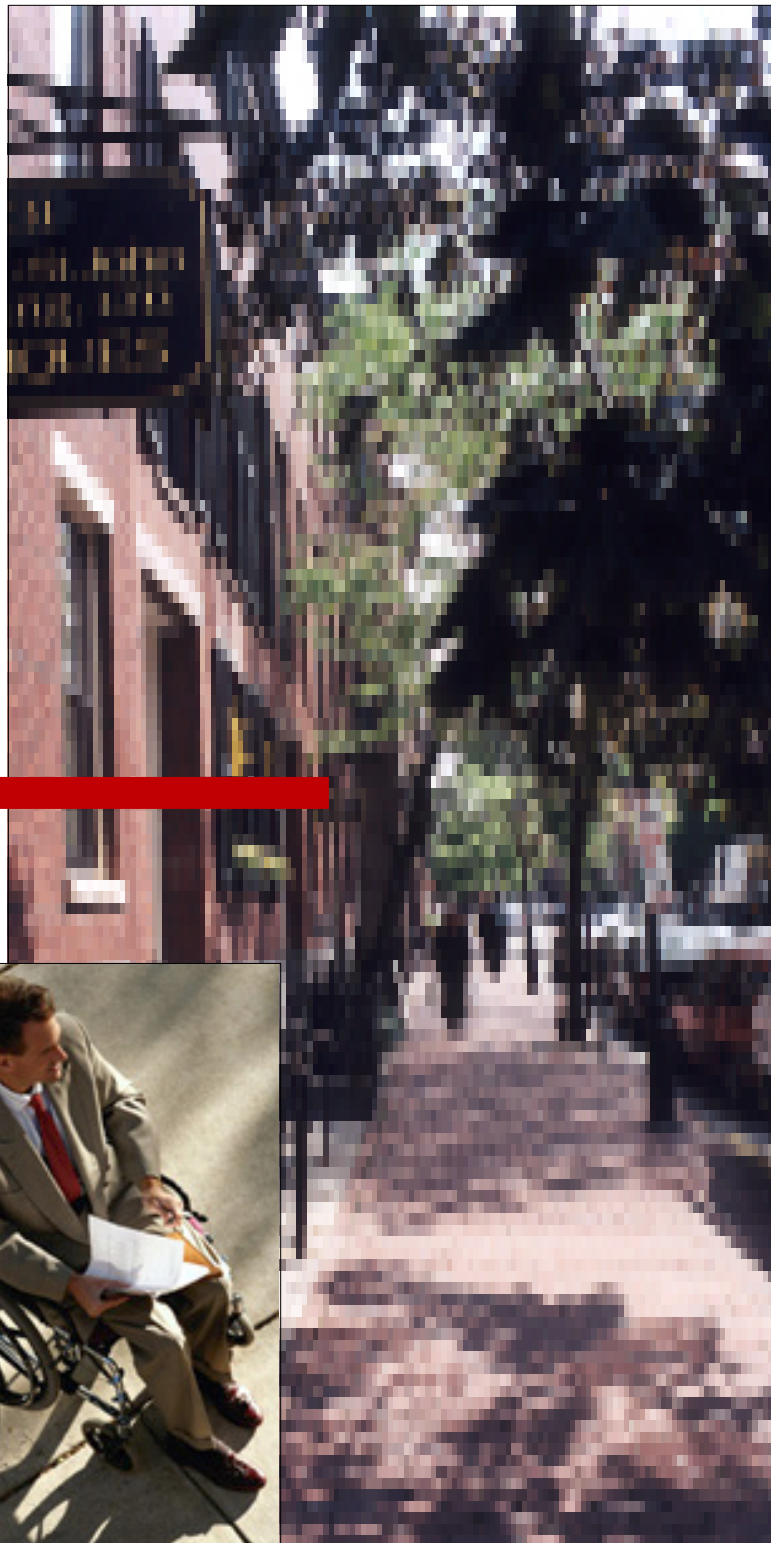
Ramps and elevators are as welcome to families with strollers as they are to chair-bound individuals.

Presently, Charles/MGH Station is not in compliance with the minimum requirements of ADAAG or the Massachusetts Architectural Access Board; it is not possible to reach the station, nor the platform level, without walking up and down numerous flights of steps. No elevators or escalators are provided. The redesign of Charles/MGH Station will provide an accessible route to an accessible entrance for public use of the transit system.

Community and Abutter Goals

The Charles/MGH Station area comprises a number of different user communities broadly described as the Red Line commuters, the residents and businesses of Beacon Hill, the hospital district, the occupants of Charles River Park, the users of the Esplanade, and the general public of the metropolitan area at large.

Each group has a priority list of features they would like to see in the development of the station and the Charles Circle environs. The common goals of these groups are similar: improved pedestrian access and accessibility, reductions to traffic congestion, a more attractive and secure sidewalk environment, and a Red Line station facility that contributes in a positive manner to the general area. The MBTA's continuing dialogue with these groups has helped to clarify their interests and concerns as well



as identify opportunities for additional improvements in the Charles Station district.

The Beacon Hill community has a longer list of issues related to the station, including train noise and vibration, security of the areas adjacent to the station, pedestrian access across Cambridge Street and to the Esplanade, and the urban fit of the station with the fabric of the historic district. With the establishment of the National Historic District, this community has recognized the fragile nature of this national treasure and has labored to maintain and preserve it for the future.

The Beacon Hill business community would like a station that completes the special retail character of Charles Street and welcomes both residents and visitors to the district. They hope that the new station design will mark the end of Charles Street in a manner that will compliment the district.

MGH and MEEI have experienced changes in medical care which have increased the outpatient component of hospital services. To meet these changing needs the hospital district must provide its patients with a barrier-free path from the station to the hospital campus. MGH would like to blend a station access point into their proposed development along Cambridge Street. This access point can take on many forms, but should reflect the visual and security goals of the hospital community.

Residents of Charles River Park would concur with the goals of the hospital and agree with the noise and security issues raised by the Beacon Hill community. With a goal of better integration of their community with the rest of the district, pedestrian access across Cambridge Street and to the Esplanade is a baseline issue to this group.

Users of the Esplanade vary in their relationship to the station. Those that arrive by the Red Line require barrier-free access from the station to the Esplanade ramps. They also

require the station to accommodate special event crowds safely, and provide clear passage and directions to concerts, celebrations, and events. Charles Circle, a major intersection, connecting pedestrian traffic from the Longfellow Bridge/Esplanade, Beacon Hill and the hospital district; regrettably, barely provides for safe access. Since the station is located within the intersection, the design of the station should incorporate improvements for pedestrian activities in order to functionally address the needs of all user groups.

Above Ground Station

The Charles/MGH Station travelers have endured years of difficult station access and substandard station facilities. The physical design of the station with its limited access, has a negative impact on the expanded use of this station by commuters. Combined with access issues are the basic problems of above ground stations. Commuters are exposed to more severe weather conditions on unprotected elevated platforms, lack of visual connections to points of security (i.e. the “eyes of the street,” MBTA staff), and the general lack of urban fit of the station with the surrounding district. The proposed modifications to Charles/MGH should try to solve as many of these issues within the given envelope of an above ground station.

Agency Review

There are a number of state and local agencies with whom the MBTA has established a technical advisory committee to assist in the development of this project. The MDC, City of Boston, including Boston Transportation Department and the Boston Redevelopment Authority, Massachusetts Historical Commission and Boston Landmarks Commission have been part of the development of the design alternatives identified in this report. The location of this station, the separate ownership of the pedestrian bridges to the station,

and the various projects ongoing in the station district suggest that cooperation and coordination among the appropriate agencies will result in a comprehensive improvement program that will go well beyond the goal of accessibility.

MBTA Project Goals

As clearly stated in the MBTA project description, the primary goal of station accessibility and modernization at Charles/MGH is to meet the federally mandated key station plan objectives of accessibility to all those with disabilities by December 31, 2003. Additionally, the MBTA has described a broader list of objectives including:

- Provide links to the new development at the Charles Street Jail site and the recreational areas of the Charles River Basin
- Develop an architectural expression appropriate as a gateway image to Boston/Cambridge
- Design a station and platform enclosure that provides a level of patron comfort and protection from the elements
- Reduce train noise and vibration
- Minimize service disruptions during construction
- Improve pedestrian and vehicle safety at Charles Circle
- Incorporate public art into the station design reflecting the history of the district

Competition Winners

First Awards

- 1 Maria Aiolova, Alexander Chouls, Tunch Gungor
- 2 Charles P. Hagenah
- 3 Robert Marks
- 4 Thomas Melville
- 5 Arturo Vasquez

Honorable Mentions

- 1 Eric Belson, Max Drivin, Michelle Ho, Anna Kuperman, Elliott Paul Rothman, Gabriel Yaari
- 2 Matthew Hyatt, Angela Ward Hyatt
- 3 Branka Milosevic
- 4 Michael O’Keefe, Belinda Watt
- 5 Jessica P. M. Pineo
- 6 Stephen Rose

Citations

- 1 Steven Beaucher, Paul Lukez
- 2 Jennifer Davy, Rolando Mendoza, Keith Nelson
- 3 Keith Engel
- 4 Susan Hoadley, William Massey
- 5 Kristen, Mary Turner, Tara

In 1998 the MBTA and Partners Healthcare, Inc. (Massachusetts General Hospital) conducted an “Open Ideas Competition of Design” for the Charles/MGH Station. The purpose of this competition was to solicit ideas for the transformation of the Charles Circle area in general and the Charles/MGH Station in particular into an accessible and welcoming gateway to the neighboring communities and institutions. The ideas competition provided an openness to examine the area without restrictions, and provides the creative forum for originality and quality civic design. Some of their major goals were:

- ⦿ Accomplish safe, barrier-free pedestrian access to the station and to each platform
- ⦿ Increase public awareness of the project and the project’s inherent complexity
- ⦿ Develop a shared vision of the development of the station district with the community and the institutional neighbors
- ⦿ Enhance the gateway/public place recognition of the site
- ⦿ Test the ability of the station to connect various uses within the district
- ⦿ Explore architectural expressions for the station, headhouse and the surrounding district
- ⦿ Visualize the impact and urban possibilities of barrier-free access to the station and across the intersection

The process commenced on August 3, 1998, and concluded nine weeks later – on October 2, 1998. The submission requirement was a simple: one 24” x 36” board.

Design Competition

A mailing of the brochure was sent to approximately 3600 architects and 100 Schools of Architecture nationally. Advertisements were run in the local newspapers, and the MBTA displayed 200 “car cards” in the Red Line trains and within the Charles/MGH station. A website was created to publicize the competition and also linked to local and national architectural societies. A total of 355 people picked up packets of information, and 133 submitted final ideas.

The judging was intense. The process was photographed and videotaped for publicity and education purposes. Each round concluded with “passionate” discussion and reasons for including certain boards in the next round. The judges decided that since it was truly an “Open Ideas Competition of Design” that there was not just one good idea, but several and decided to award five First Awards with monetary price of \$4,300, six honorable mentions with a prize of \$1,000 each and five citations of \$500 each.

The range of ideas were many but could be categorized into realistic, buildable projects. Some reused the old station, extended it further to create new pedestrian friendly entrances closer to the residential street, and others were completely futuristic with a “media” platz and projection of new technologies on the screen on the walls of the newly constructed station as if it were a stage. Others combined other levels of activities into the modern station such as a day-care facility, a casual juice-bar meeting place, exhibit space, gallery walkways. The jury did look for the bold architectural gestures.

This new design initiative has fostered public/private partnership not only in the financial commitment to the design competition and the participation in the process, but also in the financial investment in the future construction project.

A First Award (Shared) – Robert Marks

This entry moved the headhouse to the east with “walk back” connections to the existing platforms. The relocated station solves the hard urban site edge at West Cedar Street by wrapping the rail structure and completing the urban street line with the headhouse.

B First Award (Shared) – Thomas Melville

Located on the easterly traffic island and connected to either side of the intersection by tunnels, this scheme explored the gateway image potential of the site. Using “new millennium” themes, the station acts as a giant billboard, locating the urban place in a manner similar to the CITGO sign at Kenmore Square.

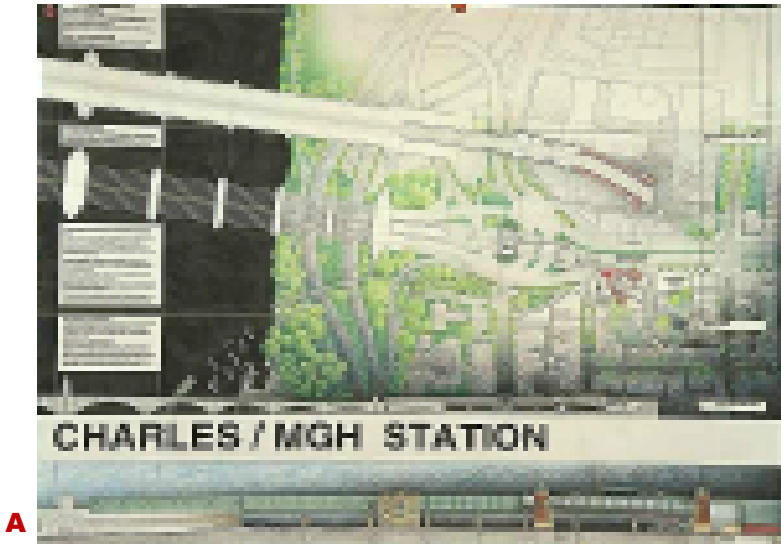
**C First Award (Shared) – Maria Aiolo
Alexander Chouls
Tunch Gungor**

“Metromedia platz” covers the intersection with an urban berm, connecting the neighbors of the district. On this “common ground” berm, it appears that all manner of possibilities can appear before your eyes – an architectural equivalent of virtual reality!

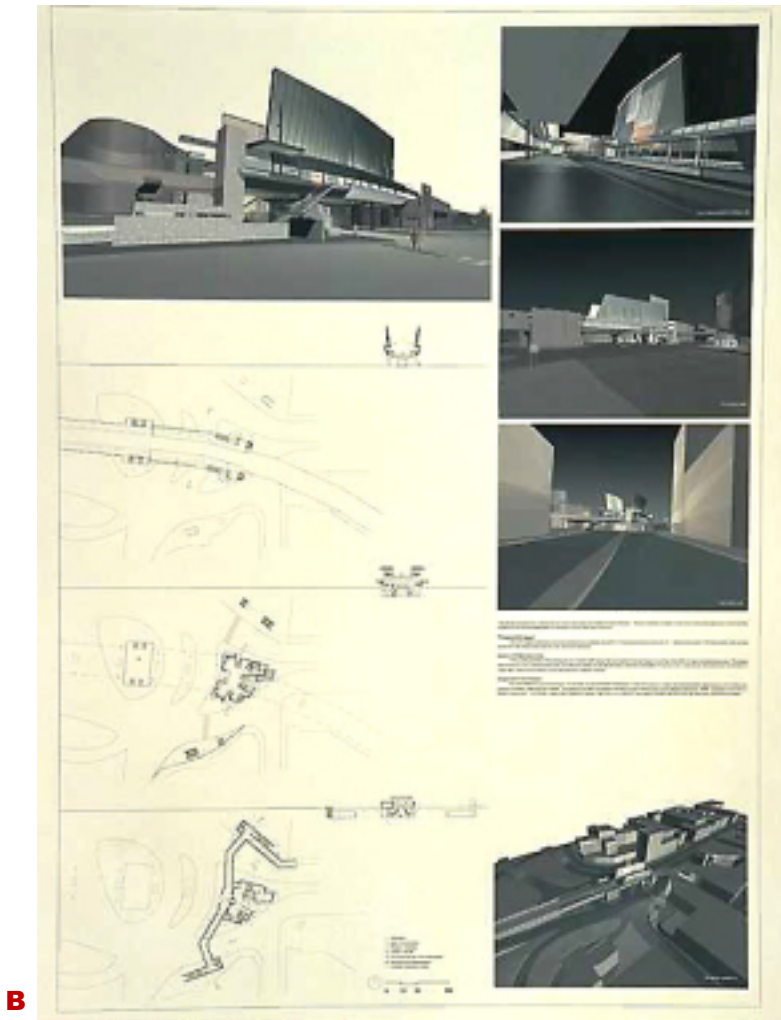
D Honorable Mention – Branka Milosevic

By making minor changes to the easterly traffic island and intersection roadway geometry, this proposal clearly solves the access issues to the station within the existing perimeters. Clever additions of drop off lanes, plantings, and curb adjustments show a real effort to take this urban space to another level. The bold maneuver in this option is the development of a

*Competition board photographs courtesy of
Phil DeJoseph, MBTA Photographer*



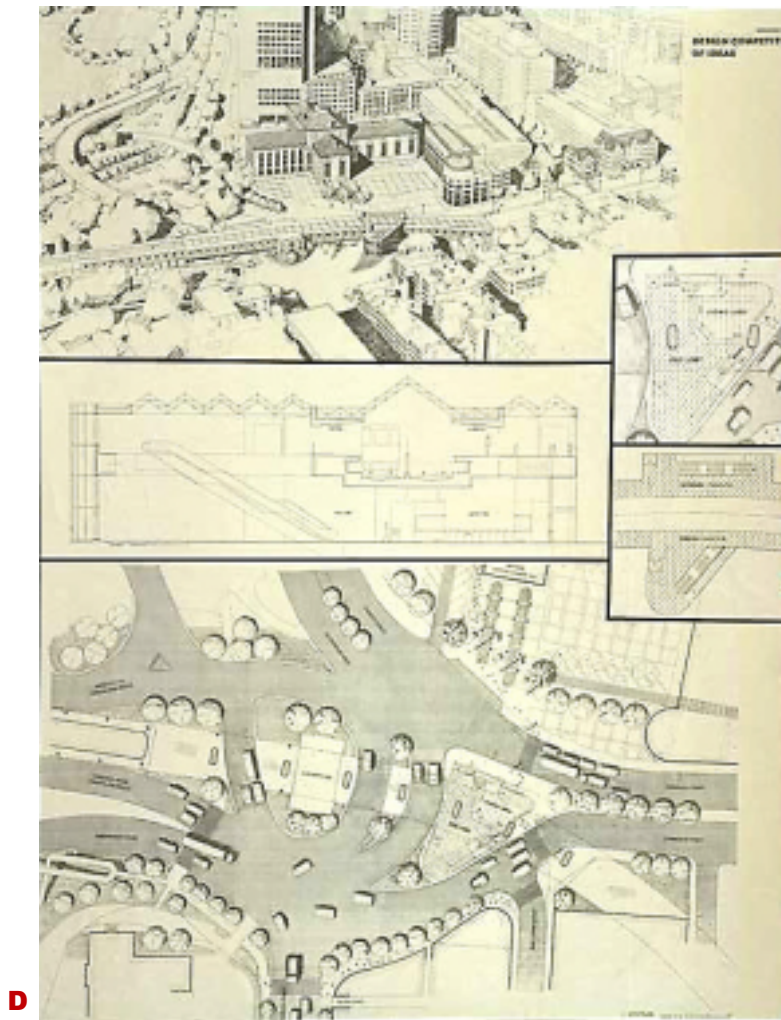
A



B



C



D



History of Charles/MGH Station

The Charles Street/MGH Station is included in the Inventory of Historic and Archaeological Assets of the Commonwealth. The station was completed in 1932 for the Boston Elevated Railway Company according to plans prepared by Boston architect R. Clipston Sturgis. The station is composed of a multi-story entrance building of cast stone and passenger platforms enclosed by copper-clad windscreens. The entrance building has a rusticated base above which smooth finished concrete is articulated on the north and south elevations by center pavilions and pilasters with molded capstones. The Art Moderne style of the building is further reinforced by long double casement windows, a chevron panel, and long window openings flanking the central opening.

The station is located outside the boundaries of the Beacon Hill Historic District; however, the portal building and a portion of the elevated track are within the bounds of the historic district. The Beacon Hill Historic District is listed in the State and National Registers of Historic Places, in addition to being a National Historic Landmark and Boston Historic District. The station is within the boundaries of the Charles River Basin Historic District, which is listed in the State and

National Registers of Historic Places. The Longfellow Bridge, which is adjacent to the project site, is a contributing element in the historic district. Although the Charles Street/MGH Station is within the bounds of the district, it is not apparent from a review of the National Register nomination for the Charles River Basin district if the station is considered contributing to the historic district.

The station is also located across Cambridge Street/Charles Street from the Suffolk County Jail (a.k.a. Charles Street Jail), which is individually listed in the State and National Registers of Historic Places.

The station has experienced various alterations and changes since its original construction that have compromised its appearance and architectural integrity. At some point the cast stone classical balustrade that surrounded the traffic circle was removed and the original sidewalk pattern changed. In the 1960's large openings were cut into the second floor level on the north and south elevations to accommodate a new elevated walkway and stair system. Also during this period the interior was completely rearranged and the underground passageway closed.



Charles Street Jail



Architectural Condition

After 68 years of use, Charles/MGH Station is in need of major repairs or replacement. The station consists of a three-story headhouse, located at one end of 424-foot-long platforms. The outboard platforms are open to the weather, although canted roofs provide some shelter. Above-grade pedestrian bridges from two directions connect to either side of the station, at mezzanine level. The station building is 42 feet wide x 70 feet long, having approximately 2,940 square feet in area at ground and mezzanine levels. At platform



South facade of station

level, the station is bisected by the elevated track structure, creating openings at either end of the building.

Constructed of highly detailed cast stone base, walls, pilasters, and friezes, the building exterior is seriously deteriorating. Major spalling of decorative elements, including cracked lintels above pedestrian walkways, and grade level doors, cracks at the underside of the bridge connections and the track girders are all evident. Vertical cracks at pilasters, corner quoins and windows indicate critical levels of damage. The cast stone corner at the northwest is separating from the structure. Cracks and missing sections of concrete bases in the freestanding columns supporting the pedestrian bridges are also evident.

At-grade steel door frames with fixed panels are rusted out at their bases, while the doors themselves, aluminum with polycarbonate glazing, are relatively intact. Rusting of the replacement exterior metal window is also occurring from moisture penetration within the walls.

Grade Level

Originally accessed at grade in a center island, the ground floor of the station is now abandoned, except for utilities and employee rest room facilities. On occasion, pedestrians, searching for a way into the station, cross Charles Circle at grade, and use one of the lower entrances, although the doors are clearly marked, "Not An Entrance." Two steel stairs lead up to mezzanine level from the ground floor. Walls of painted glazed brick are peeling throughout. Floors are unpainted concrete. Standing water was noted



Northwest corner of headhouse

on the ground floor, which appears to have entered through open windows above. Continuing water infiltration has seemingly caused old, rust-stained plaster to loosen and fall to the floor. The ceiling, wall and column surfaces throughout are peeling and deteriorating.

Lighting throughout the station consists of vandal-resistant fluorescent fixtures, which are in good condition. The fire alarm annunciator panel is located near the exterior doors and appears new. Additional electrical and fire alarm panels are housed in a locked room at grade level. The station does not have a mechanical system.

Mezzanine Level

The mezzanine, added to the original station in 1961, is tucked into what was formerly a double-height space. The space is built out with minimum headroom, tucked under the deep track girders above. Ceiling height is only about 7'-6". Now, the mezzanine serves as the entrance and exit level to the station, reached from the two remote sets of stairs and bridges: one on the Beacon Hill side, the other on the Charles Street Jail/MGH side. About 50 percent of the station traffic is by pedestrians, who wish only to cross Charles



Drain box

Circle safely. They pass through this level from one side to the other, without using the subway system. Consequently, this level receives more traffic than just the T ridership and feels cramped and undersized. Adding to this problem are the fare collection booth, signage, turnstiles, gates and public telephones, competing for space at the same level.

Mezzanine level is finished with rubber flooring throughout, which is in poor condition. Corrugated metal panels act as separation walls between this floor and ground floor. Openings in the corrugated panels are fitted with large fans, presumably for summer cooling. Vibration and noise is extremely exaggerated through this material, when trains travel through overhead, shaking the panels. The brick walls are painted, and look fresh. Ceilings are painted, coffered concrete set between the track girders. Lighting is fluorescent, new in appearance, having been installed by the MBTA in 1997.



Electric panel

Stairs, which lead up to either platform, have blind spots midway up. Users are frequently turning the corner and bumping into someone coming from the opposite direction. Rubber stair treads and landings are deteriorated and missing, while metal risers are rusted and require refinishing. Stainless steel handrails on either side and in the middle are intact, although these do not appear to meet present building code requirements.

Platform Level Enclosure

The building enclosure at platform level consists of glazed yellow brick, cast stone window surrounds and metal-framed windows. Chips and cracks in the brick and severely spalled precast elements are obvious. The metal-framed windows appear to be replacements, which are operable, however, some have been permanently fixed closed. Glass in the replacement windows is polycarbonate, fogged and opaque in places. Fluorescent light fixtures supplement incandescent can lights over the stairways. Some fixtures are newer than others; some are simply bare fluores-

cent tubes. The light levels are minimum at best, with some improvement where newer fixtures are installed. The large old can lights, some missing lamps, are not providing significant lighting.

Platforms

The original platform was extended in 1982 to the west toward the Longfellow Bridge. Unlike the original copper clad platform walls, the extension sides are steel bar fencing, separating the platform from the roadway below. The fencing, which incorporates pole mounted light fixtures, appears to be in good condition, requiring some touch up painting. The copper cladding on the exterior of the original platforms, weathered to a green color, is damaged on both sides at the base, where bent and torn away sections appear to have been hit by vehicles. The copper could be repaired. Freestanding steel columns support the platform perimeter as it extends up the Longfellow Bridge. The underside of the platform is open to the roadway below, separated only by diamond mesh fencing, whereas the platform underside at the newer section is vertical concrete construction.

Painted concrete floors make up the platform. Spalled, pitted and broken up areas mar the platforms, particularly at expansion joints, presenting a potential tripping hazard. Some concrete patching is apparent. Newer yellow textured detectable warning strips are installed at the platform edge. The platform sidewalls are vertical metal panels, with opaque polycarbonate fixed windows, centered between steel columns. The windows, fogged and defaced, are small squares. With potentially great views in all directions from the platform, the window size and placement disappoint, limiting the perspective. Wall finishes are severely alligatored and peeling. Columns need to be refinished, having rust apparent, particularly at the base. The eastern end of the platform is separated from the track with black painted fencing. While the fencing itself is in fair condition, there is a long crack in the concrete beam at the north platform where it is mounted.

The platform roof consists of wood tongue and groove planks, supported on bent steel cants. Paint is peeling off with evidence of severe water penetration in specific roof areas. Roof leaders are noted at platform corners only. Strip fluorescent light fixtures are mounted between roof bents, some newer than others. Public address speakers are mounted on the roof edge, however, no equivalent information systems, such as reader boards, are installed. Convenience outlets are noted. Audio-visual fire alarm devices appear relatively up to date.

Pedestrian Bridges

Two elevated bridge structures tie the station to either side of the roadway, one terminating at the sidewalk adjacent to the Charles Street Jail's enclosed prison yard, the other splitting and terminating at opposite sides of Charles Street. Identical in structure, the pedestrian bridges are designed with fourteen foot clearance over the roadways. Structural beams un-



Viaduct at headhouse



View from platform towards Boston



Example of platform roof deterioration

der the concrete slab add height to the vertical climb over the roadway, elevating the pedestrian bridges even further above the mezzanine level. Multiple stair runs lead from the sidewalk up to straight walkways. Both pedestrian bridges terminate short of the station with a short flight of stairs running down to mezzanine level, approximately seven and a half feet below. From there, a user must ascend to platform level, about 15 feet up. The bridges offer a safe, albeit lengthy passage to the station. Even some able-bodied passengers are unable to use the station, be-



Example of column rust

cause of the difficult pedestrian routes, up and down stairs. Elderly or physically impaired users are unable to use the station, lacking an accessible route. Both bridges are approximately 5'-6" wide, ample enough in width to allow only single file passage in either direction.

The Charles Street pedestrian bridge is an open structure, spanning the roadway and accessed from two separate stairs. The walkway is concrete on steel decking; steel diamond nosings make up the treads. Steel posts act as painted balusters supporting a stainless steel handrail. Painted mesh infills the area between posts. The supporting steel columns are rusted at their bases; concrete curbing which covered steel flanges has cracked and, in some cases, broken off is laying about nearby. Illumination on the bridge at night is strictly the ambient lighting from nearby roadway fixtures.

The MGH pedestrian bridge, an enclosed structure, acts as a shelter for homeless people. Homeless individuals, crouched in the corner, use the pedestrian bridge for shelter on a daily basis. The pedestrian bridge is built of painted steel posts, lower metal panels and upper polycarbonate glazed windows. Openings at top and bottom of its sidewalls drain the structure. Concrete floors and a corrugated steel deck ceiling complete the enclosure. Vandal resistant light fixtures are mounted to the ceiling. Lighting is mini-



View of Charles Circle from MDC ramp

mal, imparting a sense of insecurity to pedestrians. Galvanized metal handrails line the walkway and diamond-tread stairs. The roof is a ballasted system. Similarly, the supporting steel columns are rusted at their bases with cracked concrete curbing.

Structural Condition of Station

The Headhouse

The foundation of the headhouse consists of composite wood and concrete piles, placed in groups under large reinforced concrete pile caps and are interconnected with reinforced concrete grade beams. The grade beams support a reinforced concrete slab that forms the ground floor slab.

The superstructure is a riveted structural steel frame, utilizing both rolled sections and built-up shapes. The steel columns are based on the ground level concrete grade beams. Some of the headhouse structure is

supported directly off of the large track girders. The floor construction is typically 3- or 4-inch concrete slabs reinforced with heavy welded wire fabric. The roof is believed to be timber plank, supported on a steel frame.

The headhouse structure is in poor condition. There is water damage observable at interior steel columns and beams, including severe rusting at the base of several ground floor columns. There is spalling at some of the concrete encased beams at the pay lobby ceiling. There are full height vertical cracks in the masonry walls in the stairwells, probably at column locations. The exterior stonework is extensively cracked on all facades. Several lintels are de-laminating, with the stonework above them entirely spalled away. The pedestrian bridge attachments have caused severe distress to the headhouse, including masonry apparently pulling away from the building and deformation of steel lintels below the bridge doorways.

The exterior walls are 12-inch-thick solid masonry and sit on the perimeter grade beams. Steel members are built into the masonry at each floor level. Although a thorough seismic analysis of the building would be required, it can be said that the existing unreinforced masonry is not an ideal material for resisting seismic events.

The Platforms

The platform foundations consist of reinforced concrete footings in some cases, are supported on the existing track and station girders. Also, at the west end, the platform is built directly on grade over the retaining walls built for the tracks.

The 9-foot-wide section of the platform sits on the bridge abutment at the track side and on steel columns at the outside. The roof is a built-up tapered canopy beam, cantilevering off the column at the outside wall. The platform slab is a 3-inch reinforced concrete carried on small steel beam running parallel to the track. The roof is wooden plank supported on

steel purlins. In the longitudinal direction, there is no lateral load resisting system. To meet current seismic standards, some additional members would need to be introduced to the platform structure.

The 12-foot-wide platform is supported entirely by the 76-inch-deep main girder and the 42-inch-deep station girder. The floor beams sit on these two large girders, and the column hangs off the side of the floor beam and is braced to the bottom of the station girder. A built-up tapered cantilever off each column again frames the roof, with smaller purlins framing between the bents. As with the narrower platform canopy, there is no provision for lateral load in the long direction and therefore some additional bracing would be required.

In general, the condition of the platform structure above the floor level appears to be good. A minimal amount of rust was observed, and there is a good deal of peeling paint, but generally the structure appears well maintained.

Structural Condition of the Viaduct Structure

The Viaduct Structure, built by the Boston Bridge Works in 1911, consists of eleven bridge spans and ten intermediate piers that carry two Red Line Rapid Transit tracks between the Beacon Hill Tunnel abutment and the Longfellow Bridge abutment in Boston.

Deck

Overall the deck is in fair condition, as follows:

- ⦿ The ties and ballast are in satisfactory condition. The rail, track guard rail and rail fasteners are in fair to good condition.
- ⦿ Protective board, placed over the waterproofing membrane, is typically curled and loose along most of the spans. Ballast and other debris have accumulated between the protective board and concrete sidewalks. Deck joints are in fair condition. The deck joints are uneven and completely closed in some areas. Efflorescence has accumulated on the underside of the decks at random locations throughout the structure and especially near the joints where heavy deposits are found.
- ⦿ Concrete sidewalks are in poor condition. The sidewalks show various degrees of deterioration at many locations.
- ⦿ Concrete drain boxes are in fair condition. The concrete drain boxes located over the piers have evidence of cracks and spalls at several locations. The handrails are in fair condition. The handrails have rust and pitting across some of their surface.

Superstructure

In general, the superstructure is in fair condition. All exposed steel is in need of cleaning and painting.

- ⦿ The topside of through girders in several spans contains areas of top flange cover plate impacted rust corrosion where the top cover plate has been bent upward. Through girders contain collision damage at several locations. Bitumen has been applied to the bottom five inches of the girder web and stiffeners in order to protect the steel from corrosion. It appears to be in fair condition.
- ⦿ The undersides of through girders in several spans have rust stains along the edges, particularly the center girder bottom coverplates, due to impacted rust corrosion between the plates. The cover plates are wavy and curled at many locations, with separations between plates.
- ⦿ Stringers are in fair condition. The bottom flange edges of stringers on several spans have been forced away from the concrete deck, due to impacted rust between flanges and deck. The bottom flanges are transversely cupped because the edges have curled downward.



Longfellow Bridge eastbound traffic



Viaduct and piers

Substructure

The substructure is in fair condition. The Lindall Place east abutment, located near the Beacon Hill Tunnel, is generally in fair condition, with some narrow cracks, spalls, spall with rebar exposed and epoxy filled cracks.

The concrete piers range from fair condition with some cracks and minor spalls present to poor condition with extensive cracks, spall and spalls with rebar exposed. Some cracks located along the edges of the top cap moldings are typical to almost all piers

Piers with steel members are generally in fair condition; the center transverse bent girder has localized areas of heavy corrosion on the top flange, and the outside transverse girders have heavily corroded bearing plates under the middle longitudinal stringer.

Overall, the Red Line viaduct structure is in fair condition, requiring limited repair and preventive maintenance to upgrade the structure, as part of the overall station redesign.



Underside of viaduct

Geotechnical

The upper soils consist of loose to medium dense granular fill soils, generally overlying soft organic soils. In most areas, the fill and organic soils are underlain by medium stiff to stiff silty clay (Boston Blue Clay). In some areas, a zone of medium dense to dense sand and gravel is present between the organic soils and the clay. The clay is underlain by dense to very dense glacial till. In general, the till is directly underlain by bedrock consisting of argillite and sandstone. However, conditions in the vicinity of Beacon Hill are quite variable, and zones of clay and gravel as well as deeper till can underlie the upper till. The upper part of the bedrock, to depths varying as much as three feet, has weathered to hard soil in many areas.

Timber piles bearing in the clay and sand below the organic soils support the existing elevated track structure. Piles supporting the existing Charles/MGH Red Line Station are composite timber/concrete piles, bearing in the clay and sand. The portions of the piles below the groundwater level are timber and above the groundwater level are concrete.



Cambridge Street and Charles Street intersection

Environmental

Based on a review of the site history, the project area appears to be typical of most urban areas. Due to the presence of former gasoline stations, there is the potential of encountering soils and ground water contaminated with Volative Organic Compound. It is also likely that soils excavated, as part of construction of any selected alternative for station development will need to be managed in accordance with the Massachusetts Contingency Plan.

In response to concerns from Beacon Hill area residents, the MBTA completed noise and vibration studies in 1999. These studies concluded that noise mitigation will improve conditions at the Red Line portal at Charles Circle. A priority ranking was established for residential areas abutting the Red Line. This ranking was based on the relative value of noise abatement treatments for those residential areas. The resulting priority list then serves as a guideline for the MBTA in determining where to consider noise abatements, with noise abatement for highest-ranked locations considered first. Although not directly part of the Charles/MGH accessibility and modernization project, the MBTA has agreed to include noise mitigation at the portal into reconstruction of the Charles/MGH Station.

Communications

A public address system of sorts exists at Charles/MGH Station. It consists of seven small, low quality horn-type speakers, all of which are mounted on the existing overhead canopy which covers most of the outbound platform except for the platform extension which was added in 1982. These speakers are driven by public address equipment mounted in an enclosed and locked public address rack housed in an equipment room located at the south end of the outbound platform. This equipment is connected to the MBTA

Control Center at 45 High Street. The equipment produces low quality sound. There is also one horn-type speaker inside the existing Communications Room at the south end of the outbound platform.

There are three communication junction boxes (CJB's) located on the west end of the outbound platform that are in fair to poor condition. The cable entering and leaving the CJB's also appears to be in fair to poor condition. Under the inbound platform overhang, there are two communication junction boxes. The cables in and out of these CJB's are resting on the cover of a traction power manhole and will require some means of support to get them off of the cover.

There is no electronic signage currently in place to comply with ADA requirements at this station. There are visual fire alarms in place along both platforms. The fire alarm equipment is located in a street level room that also houses the Fire Department Master Box that drives this equipment.

Signals

Currently, there isn't a signal room at Charles/MGH Station. The Automatic Train Protection (ATP) equipment is controlled out of the Central Instrument Room (CIR) at Park Street. There is one wayside signal attached to the wall on the inbound track, just east of the existing platform. At each end of the station on both tracks there are high frequency impedance bonds which transmit speed control commands to the trains via the running rails. There are six train approach (TAK) lights, attached to the structure walls between the station platform and the Park Street portal.

Traction Power

Inbound Platform

The condition of the 1,000 and 2,000 kcmil in and out of pit rail switch 2 in switchbox B/A620 appears to be in good condition, as does the switchbox and switch itself. There is also a 2/0 tap from the line side of switch 2 that appears to feed dc lights and heaters in the station area. There are a total of two switches in the switchbox. Switch 1 is unused and is in the open position.



Viaduct and piers at Cambridge Street



Viaduct and piers at West Cedar Street

Should pit rail switch B/A620 fail in any way or manner, it would result in the deenergization of the pit rail. By closing normally open switches 1 and 2 in switchbox J/A620 or switches 3 and 4 in switchbox J/622, three 2,000 kcmil cables from each of the above mentioned switches which terminate at the pit rail would be energized and, in turn, energize the pit rail.

Outbound Platform

The condition of the 1,000 and 2,000 kcmil cables in and out of pit rail switch 1 in switchbox B/625 appear to be in good condition as does the switchbox and switch itself. There are a total of two switches in the switchbox. Switch 2 is unused and is in the open position.

The condition of the switches in switchboxes J/625 and J/A625 are good and will not require replacement. The switchboxes are also in good condition. All of the cabling from switches to third rail and pit rail and from switches to switches also appears to be in good condition. Switchbox J/A625 is encapsulated with 2x6's and has plywood doors on it. This switchbox will require replacement.

Track

Overview of Existing Track Alignment

The existing horizontal alignment from Beacon Hill Tunnel to Longfellow Bridge consists of two main tangents connected by a left-hand curve. The Inbound and Outbound Tracks are generally parallel. The curve is a compound curve with approach spirals. The inbound and outbound station platforms extend into the north spiral of each track. Design superelevation is 3-3/4" on the Inbound Track and 3-1/2" on the Outbound Track. Design underbalance is even on both tracks.

Outbound from the Beacon Hill Tunnel, the profile (both Inbound and Outbound Tracks) consists of an ascending 2.9% grade. Approaching the platforms the grade reduces to an ascending grade of 0.4%. Within the station platform area the profile changes to a 1.3% descending grade. Both existing station platforms are located on vertical curves.

A visual inspection of both the Inbound and Outbound Tracks was performed. The results are as follows:

- Running Rail: The rail weight and section was 115 RE. Rail was continuous welded. Rail stampings indicate that the rail was controlled cooled and rolled in 1982-1986 by the Bethlehem Steel Company's Steelton Mill.

Some specific observations:

- The gage faces of the outer rails of the Inbound and Outbound Tracks were noted to be wearing along the entire length of curve between the Beacon Hill portal and the station platforms. Wear on the running surface of the rail (tread wear) of the Inbound and Outbound Tracks did not appear to be excessive.

- Wheel burns and rail corrugations were noticed in the platform area on both tracks. The wheel burns and corrugations on the Inbound Track appeared to be worse than on the Outbound Track. One pair of joint bars was noted on the Inbound Track in the platform area and was apparently installed due to a rail defect or wheel burn.
- Rail welds were generally the Thermite-type. Plant welds were not noted. It appears that the rail (39' lengths) was field-welded in-place.
- Only a few rail joints were noted. Several rail joints were noted on the Outbound Track. These rail joints appeared to be at the ends of a rail that was cut in to replace a defective weld or other rail defect. No insulated rail joints were noted in the inspected track.
- Tie plates are the Pandrol-type (7 "x14") with 6-hole punching except where restraining rail is used. Each plate is attached to the crosstie with lock spikes (one lock spike on the field side, two lock spikes on the gage side).
- All crossties appear to be wood and generally seem to be installed square with the rail. Crosstie spacing varies from 17" at the portal to 24" in the platform area.
- Ballast appeared to be AREMA size 4 or 5. It appeared that fines were mixed in with the ballast in the station platform area.
- A ballast mat was not installed, other than within the first few hundred feet of the Beacon Hill tunnel.
- A vertical restraining rail system is installed on both tracks along the inside of the low rail on the curve leading from the station platform to the portal.
- The restraining rail weight and section was 132 RE. The restraining rail appeared to be continuously welded.
- An M&K rail lubricator is located on the Inbound Track at the south end of the platform. The device lubricates the wearing face of the restraining rail. The outer running rail is not lubricated.

Street / Local Area Utilities

The following information was used in determining the existing conditions: Existing Utility Plan (Drawing U-1) from the MBTA's Charles/MGH Station Accessibility Improvement Project (MBTA Contract No. X2PS39) developed by Howard Needles Tammen & Bergendoff; plans provided by Boston Edison Company, Boston Water & Sewer commission; Boston Gas, Boston Fire Department; a sketch based on a meeting between HDR and Bell Atlantic; and a letter from MCI Worldcom. The City of Boston Police Department indicated that they had lines in the area that were abandoned a long time ago. Cablevision of Boston and MCI Worldcom indicated that they have lines in the area whose locations are not available at the present time.



Figure U-1 - Map of area underground utility lines

Figure U-1 shows the existing utility plan for the Charles Circle area. As can be seen, there are an extensive amount of utilities running east west on either side of the station on Cambridge Street into the rotary. In addition, there are large sewer and combined sewers running north south through Charles Circle. The following general information was obtained from each utility owner:

Electrical

Boston Edison has a large number of conduits, ductbanks, and manholes in and around the project area. Typically, electrical ductbanks are installed with 3' of cover, with a minimum of 18". Street lighting and signal conduit is usually installed in the top 3'.

Water

Boston Water and Sewer Commission provides water service to the area around the existing station. Typically, water lines are installed with a minimum of 4' of cover. There are ball valves at virtually every tee and bend in the mains around the station. Fire hydrants in the area are supplied by the water mains.

Gas

Boston Gas provides natural gas service to the area; its lines are typically installed with a minimum of 4 feet of cover. The gas main lines in the area are typically 12-inch steel pipes and are located under the streets. The gas mains in the area also feed residences and businesses. There are valves in all the mains at approximately 100' maximum spacing.

Sewer

Boston Water & Sewer Commission services the area with a gravity sewer system. Due to the depth of the MWRA Combined Sewers in the area, the service lines are more than likely lower than all other utilities in the area.

Telephone Utilities

Bell Atlantic has three very large ductbanks in the station area. Two of these contain old copper wires and one contains new fiber optics. The fiber optics are a critical link to Bell Atlantic's service to northeastern Massachusetts. Typically, telephone lines and ductbanks are installed with a minimum 3' of cover.

Steam Line

A 10" diameter steam line with a 6" diameter condensate return line, owned by Massachusetts General Hospital, is located on the Longfellow Bridge. The steam line was constructed ten years ago by Com Energy to provide service to the Hospital from a power plant in Cambridge.

Vehicular Traffic

Roadway Geometry

The Charles Circle includes four approach legs and six departure legs (see Figure 1). The approaches include:

- ⦿ Cambridge Street westbound
- ⦿ Longfellow Bridge eastbound
- ⦿ Storrow Drive eastbound off-ramp, which approaches the Circle adjacent to and just south of the Longfellow Bridge
- ⦿ Storrow Drive westbound off-ramp, which approaches the Circle from the north

Departure legs include:

- ⦿ Cambridge Street eastbound
- ⦿ Longfellow Bridge westbound
- ⦿ Storrow Drive eastbound on-ramp, north of the Circle
- ⦿ Storrow Drive westbound off-ramp, adjacent to and just west of the eastbound on-ramp
- ⦿ Charles Street southbound
- ⦿ West Cedar Street southbound

The headhouse is located on a traffic circle at the center of this location. West of the circle is a three-lane

southbound section, approximately 100 feet long, that carries Cambridge Street westbound and Storrow Drive westbound off-ramp vehicles to the south end of the rotary.

East of the circle are two adjacent three-lane sections, each approximately 120 feet long, that carry Longfellow Bridge eastbound and Cambridge Street westbound off-ramp traffic to the north end of the rotary. A median island separates the adjacent sections.

Pedestrian overpasses connect the station platform to the north side of Cambridge Street at the base of the brick wall of the former Suffolk County jail, and to the south side of Cambridge Street to the east and west sides of Charles Street.

Traffic Operations

The Charles Street Circle is a unique combination of two closely spaced traffic signals and one unsignalized move. Traffic signals at the base of the Longfellow Bridge operate on three phases, including eastbound bridge traffic, Storrow Drive eastbound off-ramp and Charles Circle southbound. These moves are coordinated with a second set of signals at Cambridge Street westbound and Charles Circle northbound. An unsignalized move is the Storrow Drive westbound ramp approach to the Circle.

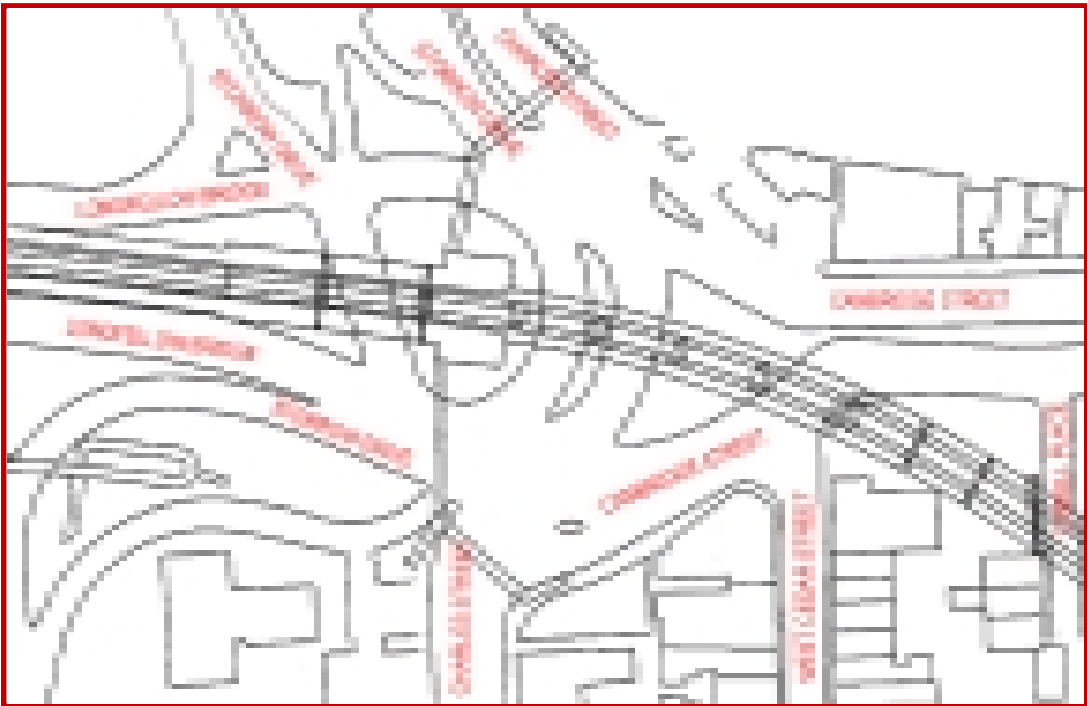


Figure 1 - Charles Circle traffic approaches

Capacity

Currently, the capacity at Charles circle is adequate. Based on observations during morning and evening peak hours, all vehicles queued at the beginning of signal green time clear the intersection each cycle. On most approaches, even vehicles arriving during green time clear. Vehicles arriving during green time on the eastbound Storrow Drive off-ramp sometimes have to wait for the next cycle.

Queues

The most significant queuing issue is the eastbound Storrow Drive off-ramp. The term *significant* is defined in terms of magnitude and impact. Observations during peak hours reveal queues of approximately 30 vehicles per lane, with the first 20 reaching back to the ramp gore, and the additional ten (200-250 feet) infringing into Storrow Drive travel lanes. This back up creates the most hazardous traffic operations problem at the Circle.

East of the station structure, under the tracks, are two three-lane storage sections divided by a median. Each section is about 120 feet long. While the section east of the median is usually clear, the section to the west at times fills and blocks flow of eastbound vehicles from the Longfellow Bridge or the Storrow Drive westbound off-ramp.

The westbound Storrow Drive off-ramp meets Cambridge Street traffic headed towards the Longfellow Bridge at an unsignalized intersection. Motorists from the ramp currently must try to force a gap in Cambridge Street westbound traffic to reach the three-lane storage section on Charles Street southbound. Traffic from Storrow Drive fills a three-lane storage

section west of the existing station structure. This short storage area (100 feet) often queues back into the path of westbound traffic, which then spills back into Cambridge Street, blocking westbound traffic.

Long queues, upwards of 30 vehicles per lane, also form across the Longfellow Bridge. While the queue is as long as that observed on the Storrow Drive eastbound off-ramp, it is confined to the bridge and does not represent a hazardous condition.

Conflicts

Two vehicular conflict areas are of concern. One is the Storrow Drive westbound ramp intersection with Cambridge Street westbound which is unsignalized. The other conflict occurs at the two three-lane storage sections just east of the station structure. Vehicles on either side of the median separating the two sections receive concurrent green time and have the same three choices towards Cambridge Street westbound, Storrow Drive westbound or Storrow Drive eastbound. This condition results in a dangerous weaving maneuver that must be performed in a short 75-foot section. Several near misses were observed at each of these conflict areas during morning and evening peak hours.

Signage

Existing signing at Charles Circle is confusing, more because of the rotary geometry than the adequacy of the signing strategy. The existing design requires too many decisions for the motorist. While everyday commuters may now be familiar with route choices, the occasional motorist can be confused. This condition was observed throughout the circle, with motorists, at times, coming to a stop in the middle of a conflict area even with a green light.

Pedestrian Flow

No pedestrian signals are provided even though crosswalks are striped. In addition, some crosswalks have no real destination. Curb cuts or sidewalk ramps are lacking. Existing pedestrian shelter islands within the intersection are too narrow. Pedestrians, looking for safe crossings, receive mixed messages. Critical at-grade pedestrian movements to and from the station occur between queued or moving vehicles, leaving pedestrians at risk.

Pedestrian patterns to and from the existing station were observed on April 7, 2000, during morning and afternoon peak periods (Figures 2, 3). Previous information indicated that approximately 15,000 pedestrians use the overpasses each day. Approximately half are passengers and the other half passing through from one side of Cambridge Street to the other.

Pedestrian Origin | Destination Survey Results

A.M. Pedestrian Survey:

- 66% of passengers exiting the station are destined for the general hospital community
- 17% are heading for Charles Street south and surrounding blocks
- 50% of arrivals to the station originated in the hospital community
- 32% come from Charles Street south

P.M. Pedestrian Survey:

- 44% of those exiting the station travel to the hospital community
- 33% headed to Charles Street south
- 79% of afternoon passengers boarding at the station originated in the hospital community
- 12% boarding, come from Charles Street south

The results show the greatest “desire lines”, or pedestrian demand, between the station and the hospital area, and between the station and the vicinity of Charles Street south and the south side of Cambridge Street (Figure 4). This is the one area where a protected pedestrian crossing cannot be provided due to existing traffic signal phasing. Currently, traffic is allowed to flow eastbound on Cambridge Street at all times, because the Storrow Drive eastbound off-ramp, Longfellow Bridge or Charles Street south beneath the viaduct always has green time. Phasing is illustrated in Figures 5-8. Each approach experiences significant queues, allowing no room to re-allocate green time for a pedestrian phase.



Figure 2 - Peak A.M. Pedestrian Traffic



Figure 3 - Peak P.M. Pedestrian Traffic

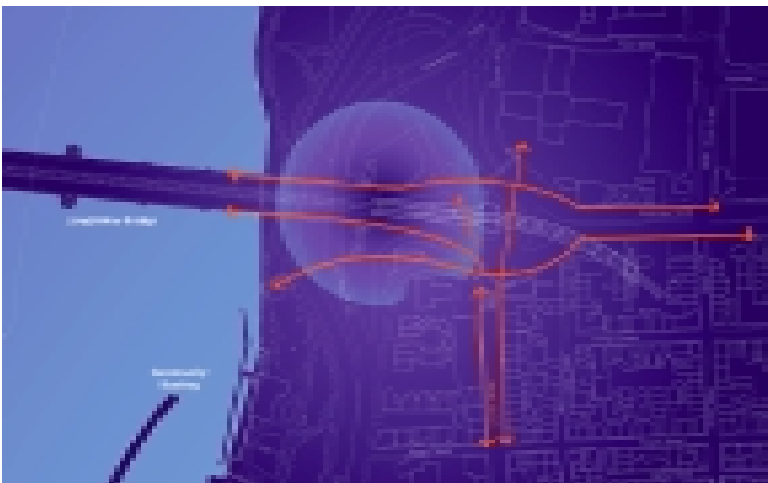


Figure 4 - Pedestrian desire lines

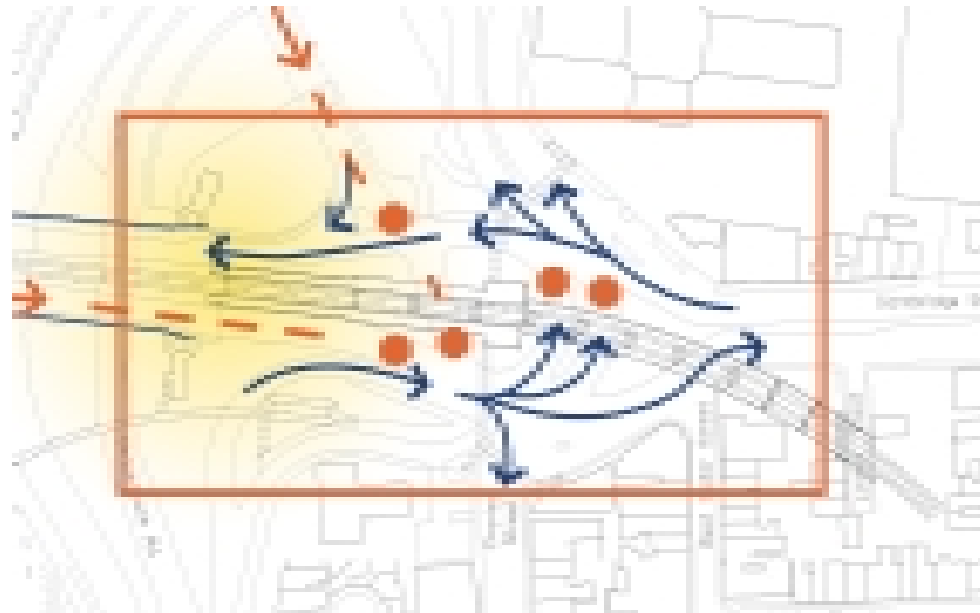


Figure 5 - Traffic Signal Operation (Phase A)
 Storrow Drive eastbound off-ramp and Cambridge Street westbound receive 7 seconds of green light time.

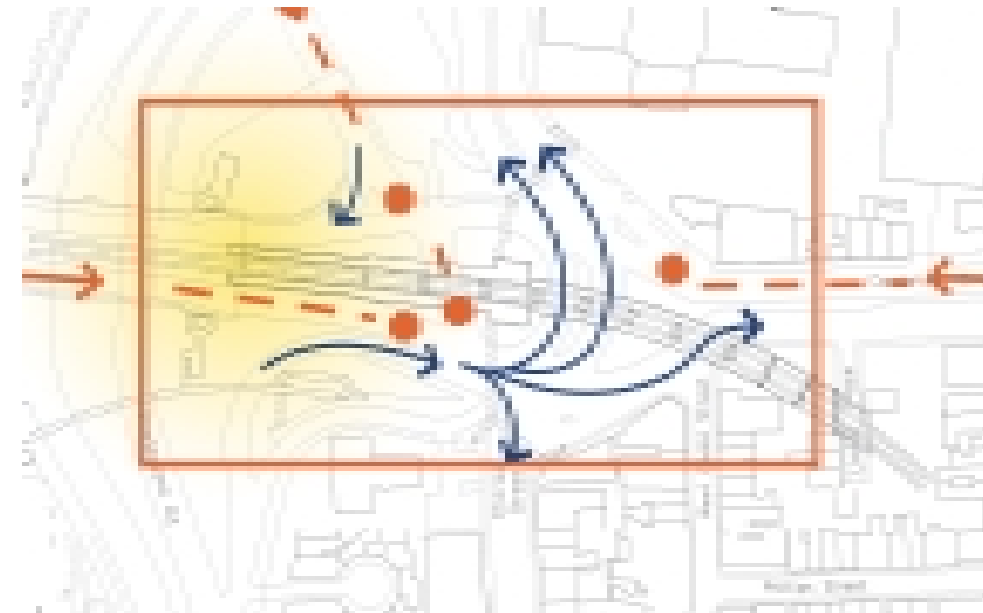


Figure 6 - Traffic Signal Operation (Phase B)
 Storrow Drive eastbound off-ramp receives 47 seconds of green light time.
 Cambridge Street westbound traffic stopped to allow off-ramp moves toward Charles Street northbound and Storrow Drive westbound on-ramp.

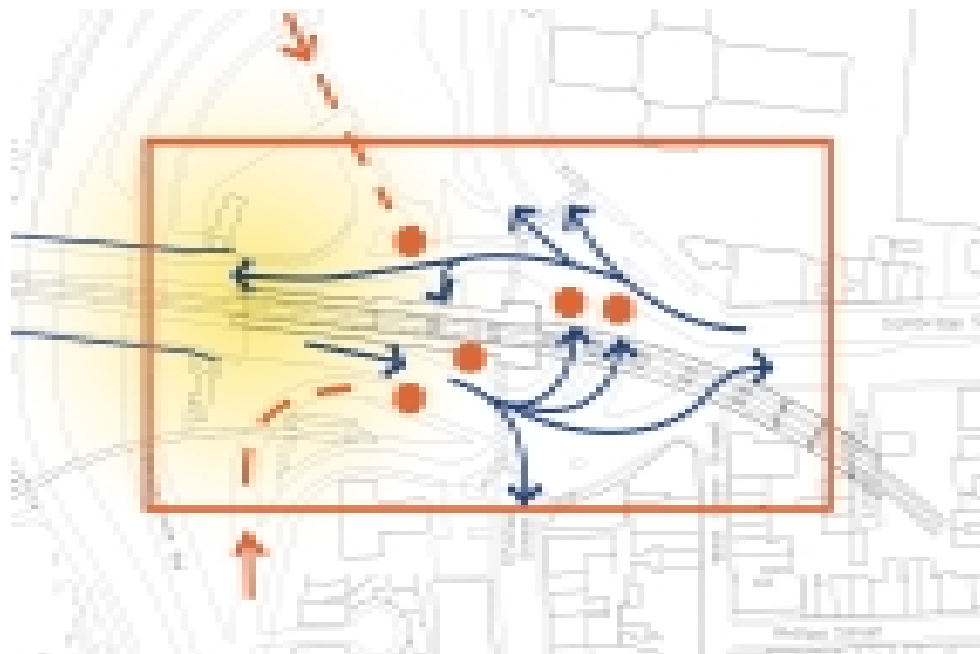


Figure 7 - Traffic Signal Operation (Phase C)
 Longfellow Bridge eastbound and Cambridge Street westbound traffic receive 20 seconds of green light time.

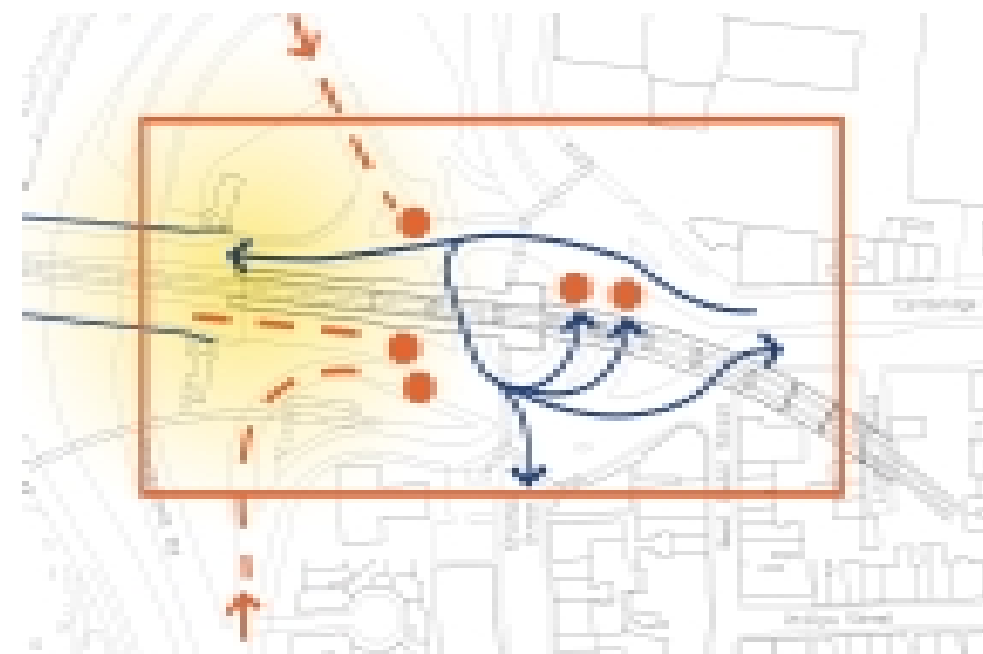


Figure 8 - Traffic Signal Operation (Phase D)
 Cambridge Street westbound traffic receives 12 seconds of green light time.

Local Area Developments

Current and Future Projects

A number of projects, both public and private, are currently under consideration in the Charles/MGH Station District. Brief descriptions of current projects follow:

Charles River Basin Master Plan

The Charles River Basin Master Plan, being prepared by the Metropolitan District Commission, is a comprehensive vision for the Charles River Basin. Its goals are to improve pedestrian access, increase accommodations for informal and formal activities and preserve historic structures. Expected release of the final draft master plan is March 2000.

Reconstruction of Cambridge Street

The City of Boston Transportation Department is currently in the design phase of a plan for reconstructing Cambridge Street, from Charles Circle to Boston City Hall. Boulevard-like pedestrian amenities, landscaping and improved traffic flow are included.

Cambridge Street / Lindall Place Office Retail Building

Proposed and well into permitting is the development of a 4,000 square foot parcel on Cambridge Street at Lindall Place. This private development seeks to build a five-story brick building, with retail at street level and four floors of office space above.

Charles Street Jail

Adjacent to the Charles/MGH Station, Massachusetts General Hospital purchased the historic Charles Street Jail in 1991 from the Commonwealth. The Jail is listed on both the State and National Registers of Historic Places. MGH is seeking private development teams to redevelop the jail property. Integration of the new development with the neighborhood, the station and MGH campus is a primary goal. Establishing a pedestrian route, from the MBTA station through the Jail site to the main hospital campus, and improving the Charles Circle streetscape are considered important criteria for successful redevelopment.

Massachusetts General Hospital

In addition to the Charles Street Jail project, MGH is preparing a master plan for its campus, including the site directly adjacent to the jail, which will include underground parking and 400,000 square feet of new ambulatory care facilities, built in two phases above the Proton Therapy Center. The opportunity to create an enhanced entrance to the hospital from the station is an important goal for MGH.

Level 3 Communications

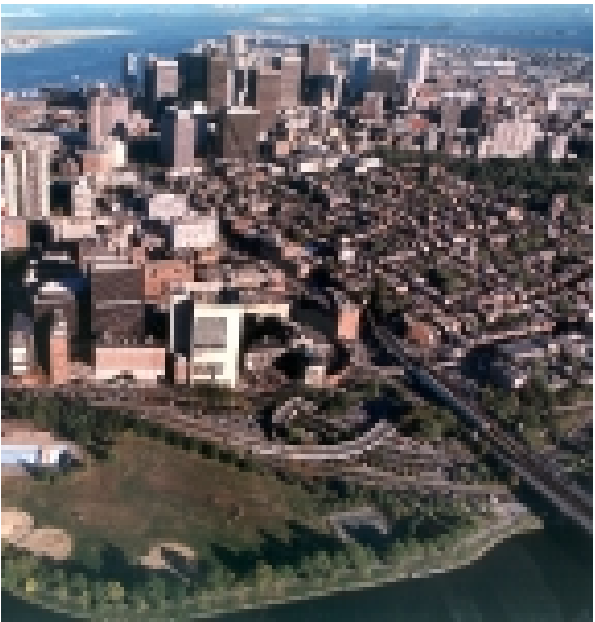
Level 3 Communications is investigating the installation of local fiber optic service between Boston and Cambridge via the Longfellow Bridge. The existing and proposed conduits are suspended from the bridge within the MBTA's "reservation". Level 3's planned work includes removal of fourteen existing conduits and replacing them with 88 smaller conduits to carry fiber optic cables. As an alternative, Level 3 is also investigating the feasibility of installing the new conduits beneath the Charles River by means of directional drilling.

29F Park

This portion of the Central Artery/Tunnel Project (CA/T) involves the expansion of the Esplanade to the north of the Charles River Dam. Nineteen acres of parkland are proposed along the north and south banks of the Charles River between the Museum of Science and the New Charles River Dam/Gridley Locks. Two major pedestrian bridges over the MBTA railroad tracks on the north and south banks of the river near North Station are proposed as part of this project. A pedestrian link from Charlestown will be provided to the 29F site through another CA/T project, 19B. Design of an MDC park maintenance facility will also be contained within the 29F parkland.

Charles River Dam Walkway

A study conducted by the MDC resulted in plans to build a new public walkway along the upstream side of the dam, along the rear facade of the Museum of



Traffic Options Methodology

The study area for this project includes the Charles Circle and its approaches. Study of this location, however, cannot be complete without consideration of the interaction with the intersection of Cambridge Street and Grove Street. The Cambridge Street intersection with Blossom Street was included in the traffic modeling program to provide context.

Traffic analysis was conducted using a multi-stage process, including field reconnaissance, data collection, description of existing conditions, development of future conditions, and future analysis.

Field Reconnaissance

Site visits were conducted to inventory the existing geometry, lane use, traffic control devices, and adjacent land use. These items were input to the traffic model to form the basis for the existing condition analysis.

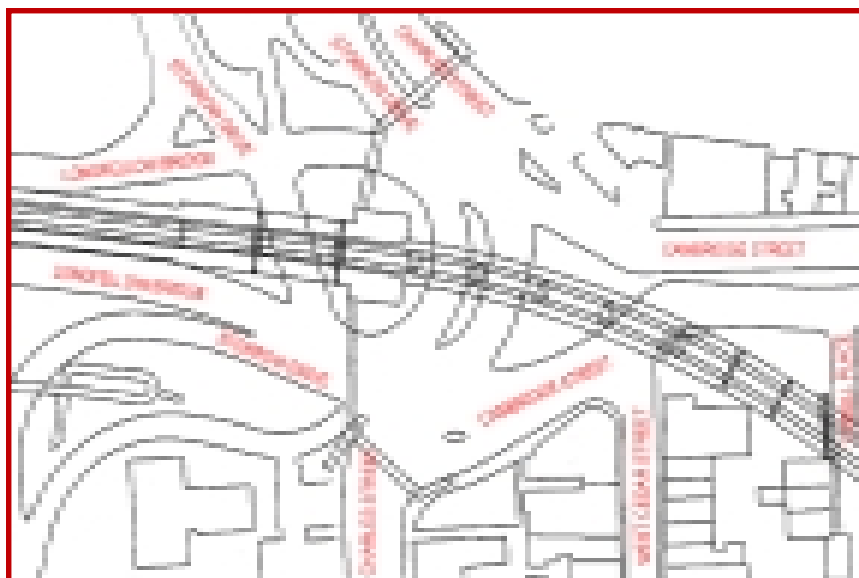


Figure 9 - Traffic Concept I

Equally important were observations of traffic patterns and conditions. Much of the congestion currently experienced at Charles Circle occurs at the south side, where Longfellow Bridge and the Storrow Drive eastbound off-ramp converge. Eastbound Cambridge Street traffic often backs up due to downstream congestion, and queues back to the Circle, where vehicles entering Charles Circle from the Storrow Drive eastbound and westbound off-ramps and from Longfellow Bridge become blocked. Another impact of this downstream effect is that the eastbound left turn lane at Grove Street becomes blocked, causing left-turning vehicles to also queue back into the Circle.

While the effect has been observed, and modeled for demonstration purposes, this is outside the scope of this project. For purposes of this project, and to understand the impact of improvements to Charles Circle, downstream congestion has not been modeled in remaining analyses.

Data Collection

Data collection included January 2000 peak hour turning movement counts at Charles Circle, and 48-hour Automatic Traffic Recorder counts on approach and departure legs. Others provided additional peak hour turning movement counts at Cambridge Street intersections between Charles Circle and Blossom Street. In addition, a peak hour pedestrian origin-destination survey was conducted in April 2000.

Future Conditions

Existing traffic volumes were used as a basis for forecasting future volumes. The Central Transportation Planning Staff (CTPS) provided annual traffic growth rates. While the final development plan for expansion of Massachusetts General Hospital (MGH) is not yet

known, an estimate of this plan was included in the CTPS forecasting model. Growth rates were then applied to existing volumes over the next ten years to develop year 2010 future volumes.

Potential Improvements

Traffic conditions described previously in Existing Conditions illustrate the need to take advantage of the opportunity to make significant transportation improvements. Potential improvement alternatives are discussed below. The descriptions are intended to illustrate major components. While not specifically noted, each alternative would also include regulatory and guide signs, to provide clear direction to motorists, and new sidewalk and curb treatments to achieve ADA and MAAB accessibility compliance.

Traffic schemes are presented at three levels of complexity. These vary depending on the impact of the final station configuration to the local roadway system, and on long-range planning potential.

Traffic Concept I

Traffic Concept I would create no impacts to the roadway system. This concept would maintain the existing roadway configuration and traffic operations as previously described in Existing Conditions, and shown in Figure 9.

Traffic patterns and signal phasing/timing would remain as they are today. Pedestrian access to the station would be provided either with overhead walkways, pedestrian tunnels, or at-grade. At-grade pedestrian crossings would still remain unprotected across the south side of Cambridge Street, due to traffic signal phasing/timing that maintains a constant flow of traffic in this roadway segment.

Traffic Concept II

Traffic Concept II, shown in Figure 10, would maintain the existing traffic flow pattern, but would result in larger traffic islands, which could provide more efficient station sites. Intersection level of service (LOS) would be acceptable, although some queuing would still occur. Westbound queues are not a safety issue because of the length of Longfellow Bridge. Likewise, the length of the Storrow Drive westbound off-ramp mitigates southbound queues. On the Storrow Drive eastbound off-ramp, however, excessive back-ups onto Storrow Drive are a safety issue. These queues would be significantly mitigated by addition of a third lane on the ramp.

An additional benefit of the third lane is that less time would be needed for vehicular movements, and green time could be provided for an exclusive pedestrian phase. This would provide safe, protected, at-grade pedestrian crossings. An option would be to distribute the extra green time to vehicular phases to further reduce queues, and to provide an above-grade or below-grade crossing.

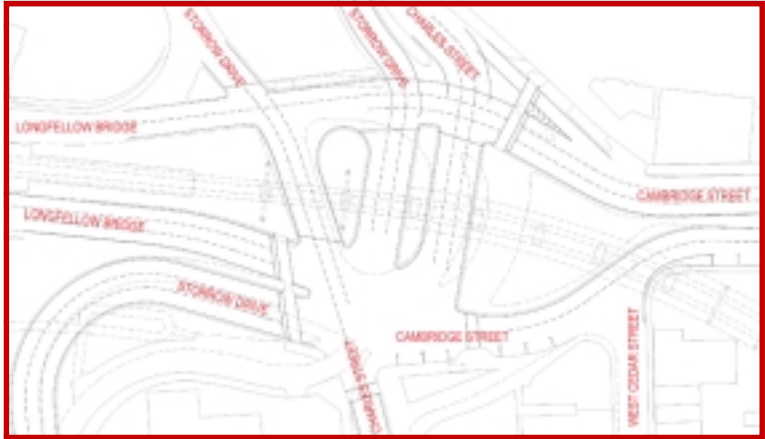


Figure 10 - Traffic Concept II

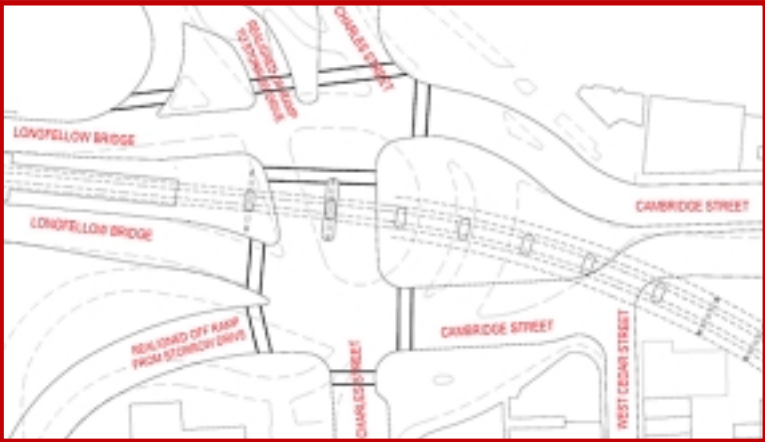


Figure 11 - Traffic Concept III

Traffic Concept III

A project of this magnitude offers the opportunity to consider long-range planning, or ways in which future transportation improvements can be evaluated to assess more global issues beyond the scope of current activities. Traffic Concept III presents a potential plan that others, beyond this project, might consider in the future. It is presented for discussion purposes only, and does not preclude other options from being considered in the future.

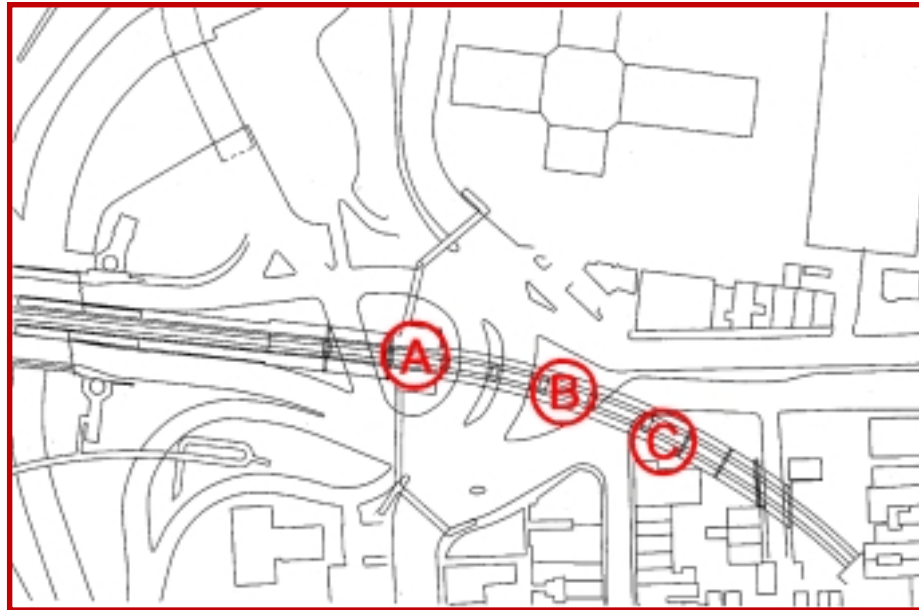
This transportation improvement would be made possible by the relocation of the MBTA's Charles/MGH Station headhouse. This plan is shown, along with Concepts I and II, to illustrate a range of considered improvements. The Boston Transportation Department (BTD) and the Metropolitan District (MDC) traffic engineering staffs, however, must review any plan.

With this long-range planning in mind, a more conventional four-way intersection has been considered, and is shown in Figure 11. This design would provide less confusing moves for motorists. Queuing issues are similar (a third eastbound Storrow Drive off-ramp would be provided), and LOS would be acceptable. Protected pedestrian moves could be provided at-grade with an exclusive pedestrian phase.

This scheme would have the disadvantage of requiring that westbound left turns from Cambridge Street to Charles Street be omitted. Access to most of Charles Street south would be via alternative routes further east of Charles Circle. Access to the section of Charles Street between Cambridge Street and Revere Street, however, would require westbound traffic to cross Longfellow Bridge, negotiate a U-turn, cross back over Longfellow Bridge eastbound, and then turn right to Charles Street.

Due to the turn restrictions and some traffic signal phasing issues, BTD traffic engineering staff has expressed some concern about this plan. As stated earlier, concept III is discussed to show a range of possible options, and further consideration is not included in the Scope of Work for this project.

Station Location Methodology



The method for developing project options/potential alternatives evolved from a process, which began by accepting the constraints of the existing station location:

- ⦿ The station is sited between the Longfellow Bridge/Charles River and the Beacon Hill portal
- ⦿ The platforms are elevated above-grade
- ⦿ The track viaduct curvature precludes relocation of the platforms

Consideration was given to modify the station location by adding program elements, such as pedestrian/vehicular improvements, to meet the project goal of access to Charles/MGH Station. Primary functional criteria were site and station access, program fit, traffic, and urban design fit.

Some solutions were ruled out without a graphic test. Station locations to the west of the existing station and center platform options were dismissed for the following reasons:

- ⦿ Options to the west placed the station well past reasonable access desire lines and conflicted with traffic patterns on the Longfellow Bridge
- ⦿ Center platform options were studied and found to require major adjustments to track geometry and structure, which resulted in overwhelming constructability and operational issues

More desirable would be station relocation to the east. This would result in a less isolated site, more directly linked to pedestrian desire lines.

Schemes that live within the existing site were tested first. These are referenced as “A” schemes. As options move to the east, “B” schemes are developed. Finally, the most easterly site option studied is referred to as “C” schemes. All options were studied with “at grade,” “tunnel,” and “bridge” solutions. Access improvements often begged the question of modifying existing conditions, specifically traffic patterns. Relative cost factors were assigned to each option, considering scope of work, constructability, and operational factors.

Headhouse Elements

For each site location option, station elements have been briefly described. The description is not to define the architecture, but rather to list the major program elements as shown in the option.

Element descriptions deal with the three major aspects of the option - the headhouse structure, the access element (i.e. bridge, tunnel, etc.), and the pedestrian/traffic modifications required for achieving access to the station and circulation through the intersection.

Project Factors

After establishing the major project priorities with the MBTA, related agencies, and the community, each option has been reviewed with a comb of basic project goals and functional determinants. Problems or improvements over the existing conditions are described relative to the issue topic. The cost of the option is projected indicating its cost ranking relative to the other studied options. Finally, a letter grade is assigned to the option indicating overall project value relative to expenditures.

Rehabilitation of Existing Station

Refer to Headhouse Options A1.0 | A1.1A | A1.1B | A1.2

Project Options / Potential Alternatives

Design Concept

Working with the limits of the existing headhouse footprint, rehabilitation options were developed with the following parameters:

- Improvements to station access and ADA compliance will be accommodated in the station design as limited by structure and existing layouts
- Existing structural frame and floor level elevations will be retained
- Stairways to platform will remain in their existing locations
- Upgrades to finishes and services will be limited to the repair and replacement of existing features
- Design choices for the replacement of exterior materials will be in keeping with and will incorporate the major materials of the existing station
- Station options will explore at grade, tunnel, and bridge access strategies

Track Alignment Modifications

The rail should be replaced with new 115 RE continuous welded rail, as part of MBTA routine maintenance program. Existing crossties will require spot replacement and re-spacing.

Traffic Modifications / Relocations

The station location would not result in changes to existing roadway patterns or operations. As such, no significant traffic improvements would be required.

Pedestrian Access

The ability of pedestrians to cross at grade offers significant benefits, primarily in flexibility relating to overpass requirements and in pedestrian convenience. North of the circle, existing traffic signal phasing would allow for protected at-grade pedestrian crossings, both across Cambridge Street westbound and across the adjacent three-lane segments to the east of the station house. South of the circle, however, a pro-

tected pedestrian crossing across Cambridge Street eastbound is not currently possible. The signal phasing currently allows continuous flow from either the Longfellow Bridge or the two Storrow Drive off-ramps. Taking green time away from any of these moves would only increase queues and delays that are already too long.

A minimal treatment would be to provide an at-grade, unprotected crosswalk across Cambridge Street eastbound, between Charles and West Cedar Streets. No protection would be provided, since signal timing/phasing would not be modified, but “crosswalk ahead” warning signs could be installed to alert motorists of pedestrian activity.

Vehicular Access

New traffic guide signs and pavement markings, to reduce motorist confusion and to better define travel ways, would be provided.

Project Factors

A Traffic

Maintains existing traffic pattern.

B Barrier-Free Access to the Station

Pedestrian access to headhouse located inside a rotary is very difficult – too much waiting time for signals leading to jaywalking and accidents. However, at grade access eliminates some stair climbing, compared to the existing station arrangements. Sight lines around piers are poor.

C Barrier-Free Access within the Station

Access in station via minimum size elevators. No escalators possible within existing headhouse footprint.

D Urban Design

Headhouse isolated from the adjacent pedestrian activity and land uses by a sea of roadways – not part of the neighborhood.

E Noise Mitigation

The physical design of the station has no effect in controlling rail noise. Effective passive noise control panels could be added to the faces of the track structure girders from the portal to the station.

F Compatibility with the Future Blue Line Extension

Vertical connections down to a tunnel linking the Blue Line extension would have to be constructed. Limited station area allows for elevator and stair link only. Tunnel connections are complicated by utility interference within the intersection.

G Track

Existing track layout remains. Updates to power and signal are required to meet code and operations standards.

H Platform

Existing platform is retained. Upgrades to finishes and general repairs are required to extend serviceable life and update appearance.

I Constructability

Major demolition and construction within the framework of the existing structure will require complex phasing and temporary enclosures and circulation pathways during construction. Station uses will be surrounded by construction on a daily basis.

J Cost \$ K Value D

Description of Headhouse Elements

- 1

Major rehab to existing station headhouse
 - Station stripped back to structural steel frame – existing floor elevations are retained
 - Pay plaza relocated to grade level
 - Two minimum-size elevators are provided for disabled access from grade to platform levels
 - Stairs provide access to platforms for able-bodied travelers
 - Severely deteriorated existing cast stone façade is completely removed and replaced with a new façade system engineered to withstand structurally induced vibrations.
- 2

Restriped crosswalk with advance “pedestrian crossing” warning sign
- 3

Existing protected pedestrian crossing

A 1.0

Major Rehabilitation to Station at Existing Location with At-Grade Access

Major Rehabilitation
to Station at
Existing Location
with Pedestrian
Tunnel Access
(Option A)

Project Factors

A Traffic

Traffic pattern and signaling remain unchanged.

B Barrier-Free Access to the Station

Tunnel pathway avoids issues of surface traffic, however, tunnels are long and unsupervised, thus a potential for criminal activity that will discourage their use and use of the station. Due to utilities, tunnels are deep, say +/- 35' from street to floor level, requiring escalators, elevators, and adding to the climb to the above ground platforms.

C Barrier-Free Access within the Station

Access from street to platform could require three separate elevator rides:

1. Street level to tunnel
2. Tunnel level to pay level
3. Pay level to platform

Remote location of elevators increases chance of vandalism, putting them out of service. Able-bodied access path is burdened with additional stairs from tunnel to upper level.

D Urban Design

Headhouse isolated from the adjacent pedestrian activity and land uses by tunnel access - not part of the neighborhood. Street headhouses add little to the neighborhood as isolated elements. Unsupervised, these structures can become troublesome collectors of criminal or antisocial activity.

E Noise Mitigation

The physical design of the station has no effect in controlling rail noise. Effective passive noise control panels could be added to the faces of the track structure girders from the portal to the station.

F Compatibility with the Future Blue Line Extension

Tunnel connections to the Charles/MGH station would be directly linked to the Blue Line extension tunnel. Knock out panels constructed within the tunnel walls would facilitate phased connections between the two projects.

G Track

Existing track layout remains. Updates to power and signal are required to meet code and operations standards.

H Platform

Existing platform is retained. Upgrades to finishes and general repairs are required to extend serviceable life and update appearance.

I Constructability

Major demolition and construction within the framework of the existing structure will require complex phasing and temporary enclosures and circulation pathways during construction. Major impact on existing utilities requires complex relocation and staging. Station uses will be surrounded by construction on a daily basis. Construction of pedestrian tunnels is difficult, costly, and impacts traffic during construction.

J Cost \$\$\$ K Value D-

Description of Headhouse Elements

- 1 Major rehab to existing station headhouse
 - ⦿ Station stripped back to structural steel frame – existing floor elevations are retained
 - ⦿ Pay plaza relocated to grade level
 - ⦿ Two minimum-size elevators are provided for disabled access from grade to platform levels
 - ⦿ Stairs provide access to platforms for able-bodied travelers
 - ⦿ Severely deteriorated existing cast stone façade is completely removed and replaced with a new façade system engineered to withstand structurally induced vibrations.
- 2/3 Glass enclosed curbside headhouse with minimum elevator and stair elements.
- 4 Pedestrian tunnels with standard MBTA finishes. Tunnel locations below-grade governed by existing utilities. Water table near surface requires slurry wall type construction.

Project Factors

A Traffic

Traffic pattern and signaling remain unchanged.

B Barrier-Free Access to the Station

Tunnel pathway avoids issues of surface traffic, however, tunnels are long and unsupervised, thus a potential for criminal activity that will discourage their use and use of the station. Due to utilities, tunnels are deep, say +/- 35' from street to floor level, requiring escalators, elevators, and adding to the climb to the above ground platforms.

C Barrier-Free Access within the Station

Access from street to platform could require three separate elevator rides:

- 1. Street level to tunnel
- 2. Tunnel level to pay level
- 3. Pay level to platform

Remote location of elevators increases chance of vandalism, putting them out of service. Able-bodied access path is burdened with additional stairs from tunnel to upper level

D Urban Design

Headhouse isolated from the adjacent pedestrian activity and land uses by tunnel access - not part of the neighborhood. Street headhouses add little to the neighborhood as isolated elements. Unsupervised, these structures can become troublesome collectors of criminal or antisocial activity.

E Noise Mitigation

The physical design of the station has no effect in controlling rail noise. Effective passive noise control panels could be added to the faces of the track structure girders from the portal to the station.

F Compatibility with the Future Blue Line Extension

Tunnel connections to the Charles/MGH station would be directly linked to the Blue Line extension tunnel. Knock out panels constructed within the tunnel walls would facilitate phased connections between the two projects.

G Track

Existing track layout remains. Updates to power and signal are required to meet code and operations standards.

H Platform

Existing platform is retained. Upgrades to finishes and general repairs are required to extend serviceable life and update appearance.

I Constructability

Major demolition and construction within the framework of the existing structure will require complex phasing and temporary enclosures and circulation pathways during construction. Major impact on existing utilities requires complex relocation and staging. Station uses will be surrounded by construction on a daily basis. Construction of pedestrian tunnels is difficult, costly, and impacts traffic during construction.

J Cost \$\$\$

K Value D-

Description of Headhouse Elements

- 1

Major rehab to existing station headhouse
 - Station stripped back to structural steel frame – existing floor elevations are retained
 - Pay plaza relocated to grade level
 - Two minimum-size elevators are provided for disabled access from grade to platform levels
 - Stairs provide access to platforms for able-bodied travelers
 - Severely deteriorated existing cast stone façade is completely removed and replaced with a new façade system engineered to withstand structurally induced vibrations.
- 2/3

Glass enclosed curbside headhouse with minimum elevator and stair elements.
- 4

Pedestrian tunnels with standard MBTA finishes. Tunnel locations below-grade governed by existing utilities. Water table near surface requires slurry wall type construction.
- 5

Curb line is revised for new headhouse site.

A1.1B

Major Rehabilitation to Station at Existing Location with Pedestrian Tunnel Access (Option B)

Major Rehabilitation
to Station at
Existing Location
with Pedestrian
Bridge Access

A 1.2

Project Factors

A Traffic

Requires minor changes to roadway geometry. Should not impact traffic flow.

B Barrier-Free Access to the Station

Access pattern to station is similar to existing bridge/stair path, however, pedestrian access is improved by more direct, wider, and fully enclosed bridges. Through truss design reduces climbing distances. Elevators from street to bridge level and ramps from bridge to lobby level greatly improve access to facility.

C Barrier-Free Access within the Station

Access from pay plaza to platforms is by elevator located on the pay side of sequence. Escalators from lobby to platforms not possible within footprint of existing structure. However, escalators from pay plaza to platforms are possible with major structural reconfiguration.

D Urban Design

Headhouse isolated from the adjacent pedestrian activity and land uses by sea of roadways – not part of the neighborhood. New, more convenient, and more attractive bridges/entry structures make a stronger visual tie between the headhouse and the neighborhood, but still suffer from being isolated and unsupervised structures.

E Noise Mitigation

The physical design of the station has no effect in controlling rail noise. Effective passive noise control panels could be added to the faces of the track structure girders from the portal to the station.

F Compatibility with the Future Blue Line Extension

Blue Line connections are only feasible into the base of remote headhouse 2 on the north side of Cambridge Street.

G Track

Existing track layout remains. Updates to power and signal are required to meet code and operations standards.

H Platform

Existing platform is retained. Upgrades to finishes and general repairs are required to extend serviceable life and update appearance.

I Constructability

Major demolition and construction within the framework of the existing structure will require complex phasing and temporary enclosures and circulation pathways during construction. Station uses will be surrounded by construction on a daily basis. During construction, will have to provide temporary access to station. This access, probably at grade, may impact traffic during some phases of construction.

J Cost \$\$

K Value C-

Description of Headhouse Elements

- 1Major rehab to existing station headhouse
 - Station stripped back to structural steel frame – existing floor elevations are retained
 - Pay plaza remains on mezzanine level.
 - Two minimum size elevators are provided for disabled persons' access from mezzanine to platform levels.
 - Stairs provide access to platforms for able-bodied travelers
 - Severely deteriorated existing cast stone façade is completely removed and replaced with a new façade system engineered to withstand structurally induced vibrations.
- 2/3Glass enclosed curbside headhouse with minimum elevator and stair elements.
- 4Glass enclosed pedestrian bridges – steel truss structured to minimize overall depth and allow adequate truck clearances below. Bridges ramp into station headhouse structure and connect to the existing mezzanine pay plaza level.

Design Concept

Working within the general limits of the existing headhouse traffic island, new headhouse options were developed with the following parameters:

- Station program areas are increased to allow expanded free and paid plaza areas, enlarged stairs, escalators, and elevator connections to the platforms
- Existing floor elevations will be retained
- New headhouse structure will replace existing framing
- Improvements to station access and ADA compliance will be maximized and will be featured in the basic station design
- Exterior material choices will be in keeping with the existing platform enclosures but will allow greater visual transparency of the headhouse to be developed
- Upgrades to finishes and services will update the station to current MBTA standards
- Station options will explore at grade, tunnel, and bridge access strategies

Track Alignment Modifications

The rail should be replaced with new 115 RE continuous welded rail, as part of MBTA routine maintenance program. Existing crossties will require spot replacement and re-spacing.

Traffic Modifications / Relocations

The station location would not result in changes to existing roadway patterns or operations. No significant traffic improvements would be required.

Pedestrian Access

The ability of pedestrians to cross at grade offers significant benefits, primarily in flexibility relating to overpass requirements and in pedestrian convenience. North of the circle, existing traffic signal phasing would allow for protected at-grade pedestrian crossings, both across Cambridge Street westbound and across the adjacent three-lane segments to the east of the station house. South of the circle, however, a protected pedestrian crossing across Cambridge Street eastbound is not currently possible. The signal phasing currently allows continuous flow from either the Longfellow Bridge or the two Storrow Drive off-ramps. Taking green time away from any of these moves would only increase queues and delays that are already too long.

A minimal treatment would be to provide an at-grade, unprotected crosswalk across Cambridge Street eastbound, between Charles and West Cedar Streets. No protection would be provided, since signal timing/phasing would not be modified, but “crosswalk ahead” warning signs could be installed to alert motorists of pedestrian activity.

Vehicular Access

New traffic guide signs and pavement markings to reduce motorist confusion and to better define travel ways, would be provided.

Utilities

Constructing any new structures for this project will require significant relocation of existing utilities. Any relocation of electrical, water, gas and sewer may be performed in a traditional manner. Since many of the existing utilities are located in or near the streets, any utility work will adversely affect traffic flow in the area.

Major Rehabilitation to New Headhouse at Existing Location

Refer to Headhouse Options A2.0 | A2.1A | A2.1B | A2.2

A2.0
New Enlarged
Station at Existing
Station Location with
At-Grade Access

Project Factors

A Traffic

Traffic pattern and signaling remain unchanged.

B Barrier-Free Access to the Station

Pedestrian access to headhouse located inside a rotary is very difficult – too much waiting time for signals leading to jaywalking and accidents. However, at grade access eliminates some stair climbing, compared to the existing station arrangements. Pedestrian access to the headhouse would be provided at-grade, although the crossing on the south side of Cambridge Street would be unprotected.

C Barrier-Free Access within the Station

Assuming fare collection is at grade, the station needs two elevators (in a supervised location) to provide direct connections to the platforms. The able-bodied pathway is provided by stairs and escalators to and from grade level and the platforms. With an expanded station area a more gracious stair and stair-landing sequence can be developed.

D Urban Design

Headhouse isolated from the adjacent pedestrian activity and land uses by sea of roadways – not part of the neighborhood. With a reconfiguration of the headhouse façade it is possible to develop a station that is, in spite of the island location, generally more open, friendly, and accommodating than the present structure.

E Noise Mitigation

The physical design of the station has no effect in controlling rail noise. Effective passive noise control panels could be added to the faces of the track structure girders from the portal to the station.

F Compatibility with the Future Blue Line Extension

Vertical connections down to a tunnel linking the Blue Line extension would have to be constructed. Piggyback-ing stairs and escalators would centralize the access path. Tunnel connections are complicated by utility interference within the intersection.

G Track

Headhouse isolated from the adjacent pedestrian activity and land uses by sea of roadways – not part of the neighborhood.

H Platform

Existing track layout remains. Updates to power and signal are required to meet code and operations standards.

I Constructability

Major demolition and construction within the framework of the existing structure will require complex phasing and temporary enclosures and circulation pathways during construction. Station uses will be surrounded by construction on a daily basis. With enlarged island construction, there will be some temporary impacts on traffic during construction. Pedestrian access to headhouse will also be impacted.

J Cost \$\$

K Value C-

Description of Headhouse Elements

- 1
- Total new headhouse provides ability to provide adequately sized vertical transportation elements and expand the existing cramped free and pay plaza areas.
 - Existing traffic island is enlarged slightly to accept enlarged station area/program
 - Pay plaza is relocated to grade level
 - With increased station area larger elevators, stairs, and escalators can be accommodated
- 2
- Restriped crosswalk with advance “pedestrian crossing” warning sign. Unprotected crossing.
- 3
- Existing protected pedestrian crossing

Project Factors

A Traffic

Traffic pattern and signaling remain unchanged.

B Barrier-Free Access to the Station

Tunnel pathway avoids issues of surface traffic, however, tunnels are long and unsupervised, thus a potential for criminal activity that will discourage their use and use of the station. Due to utilities, tunnels are deep, say +/- 35' from street to floor level, requiring escalators, elevators, and adding to the climb to the above ground platforms.

C Barrier-Free Access within the Station

Access from street level to platform requires two elevator or escalator rides – street to tunnel, then tunnel to platform.

D Urban Design

Headhouse isolated from the adjacent pedestrian activity and land uses by tunnel access – not part of the neighborhood. Street headhouses add little to the neighborhood as isolated elements. Unsupervised, these structures can become troublesome collectors of criminal or antisocial activity.

E Noise Mitigation

The physical design of the station has no effect in controlling rail noise. Effective passive noise control panels could be added to the faces of the track structure girders from the portal to the station.

F Compatibility with the Future Blue Line Extension

Tunnel connections to the Charles/MGH station would be directly linked to the Blue Line extension tunnel. Knock-out panels constructed within the tunnel walls would facilitate phased connections between the two projects.

G Track

Existing track layout remains. Updates to power and signal are required to meet code and operations standards.

H Platform

Existing platform is retained. Upgrades to finishes and general repairs are required to extend serviceable life and update appearance.

I Constructability

Major demolition and construction within the framework of the existing structure will require complex phasing and temporary enclosures and circulation pathways during construction. Major impact on existing utilities requires complex relocation and staging. Station uses will be surrounded by construction on a daily basis. Construction of pedestrian tunnels is difficult, costly, and impacts traffic during construction.

J Cost \$\$\$

K Value C-

A2.1A

New Enlarged Station at Existing Station Location with Pedestrian Tunnel Access (Option A)

Description of Headhouse Elements

- 1

Total new headhouse provides ability to provide adequately sized vertical transportation elements and expand the existing cramped free and pay plaza areas.
 - Existing traffic island is enlarged slightly to accept enlarged station area/program.
 - Pay plaza is located at tunnel level.
 - With increased station area larger elevators, stairs, and escalators can be accommodated.
- 2/3

Glass enclosed curbside headhouse with minimum elevator, stair, and escalator (up only) elements.
- 4

Pedestrian tunnels with standard MBTA finishes. Tunnel locations below grade governed by existing utilities. Water table near surface requires slurry wall type construction. Pay plaza is entered at tunnel level. Fare collection activities at tunnel level allows a greater level of supervision and security to be present within the tunnel limits.

A2.1B
New Enlarged
Station at Existing
Station Location with
Pedestrian Tunnel
Access (Option B)

Project Factors

- A

Traffic

Traffic pattern and signaling remain unchanged.
- B

Barrier-Free Access to the Station

Tunnel pathway avoids issues of surface traffic, however, tunnels are long and unsupervised, thus a potential for criminal activity that will discourage their use and use of the station. Due to utilities, tunnels are deep, say +/- 35' from street to floor level, requiring escalators, elevators, and adding to the climb to the above ground platforms.
- C

Barrier-Free Access within the Station

Access from street level to platform requires two elevator or escalator rides – street to tunnel, then tunnel to platform.
- D

Urban Design

Headhouse isolated from the adjacent pedestrian activity and land uses by tunnel access – not part of the neighborhood. Street headhouses add little to the neighborhood as isolated elements. Unsupervised, these structures can become troublesome collectors of criminal or antisocial activity.
- E

Noise Mitigation

The physical design of the station has no effect in controlling rail noise. Effective passive noise control panels could be added to the faces of the track structure girders from the portal to the station.
- F

Compatibility with the Future Blue Line Extension

Tunnel connections to the Charles/MGH station would be directly linked to the Blue Line extension tunnel. Knock-out panels constructed within the tunnel walls would facilitate phased connections between the two projects.
- G

Track

Existing track layout remains. Updates to power and signal are required to meet code and operations standards.
- H

Platform

Existing platform is retained. Upgrades to finishes and general repairs are required to extend serviceable life and update appearance.
- I

Constructability

Major demolition and construction within the framework of the existing structure will require complex phasing and temporary enclosures and circulation pathways during construction. Major impact on existing utilities requires complex relocation and staging. Station uses will be surrounded by construction on a daily basis. Construction of pedestrian tunnels is difficult, costly, and impacts traffic during construction.
- J

Cost

\$\$\$

K

Value

C-
- Description of Headhouse Elements
- 1

Total new headhouse provides ability to provide adequately sized vertical transportation elements and expand the existing cramped free and pay plaza areas.
 - Existing traffic island is enlarged slightly to accept enlarged station area/program
 - Pay plaza is located at tunnel level.
 - With increased station area larger elevators, stairs, and escalators (in both directions) can be accommodated.

2/3

Glass-enclosed curbside headhouse with minimum elevator, stair, and escalator (up only) elements.

4

Pedestrian tunnels with standard MBTA finishes. Tunnel locations below grade governed by existing utilities. Water table near surface requires slurry wall type construction. Pay plaza is entered at tunnel level. Fare collection activities at tunnel level allows a greater level of supervision and security to be present within the tunnel limits.

5

Curb line is revised for new headhouse site.
- 38

Project Factors

A Traffic

Requires minor changes to roadway geometry. Should not impact traffic flow.

B Barrier-Free Access to the Station

Access pattern to station is similar to existing bridge/stair path, however, pedestrian access is improved by more direct, wider, and fully enclosed bridges. Through truss design reduces climbing distances. Elevators from street to bridge level and ramps from bridge to lobby level greatly improve access to facility.

C Barrier-Free Access within the Station

Assuming fare collection is at the mezzanine level, two elevators (in a supervised location) provide direct connections to the platforms. The able-bodied pathway is provided by stairs and escalators (up only) to and from the mezzanine level and the platforms. With an expanded station area, a more gracious stair and stair landing can be developed.

D Urban Design

Headhouse isolated from the adjacent pedestrian activity and land uses by ramp access – not part of the neighborhood. With a reconfiguration of the headhouse façade it is possible to develop a station that is, in spite of the island location, generally more open, friendly, and accommodating than the present structure. With a new headhouse structure it is easier to integrate the bridges with the headhouse. This makes the headhouse visually and physically more a part of the neighborhood.

E Noise Mitigation

The physical design of the station has no effect in controlling rail noise. Effective passive noise control panels could be added to the faces of the track structure girders from the portal to the station.

F Compatibility with the Future Blue Line Extension

Blue Line connections are only feasible into the base of remote headhouse 2 on the north side of Cambridge Street.

G Track

Existing track layout remains. Updates to power and signal are required to meet code and operations standards.

H Platform

Existing platform is retained. Upgrades to finishes and general repairs are required to extend serviceable life and update appearance.

I Constructability

Major demolition and construction within the framework of the existing structure will require complex phasing and temporary enclosures and circulation pathways during construction. Station uses will be surrounded by construction on a daily basis. With enlarged island construction, there will be some temporary impacts on traffic during construction. Pedestrian access to headhouse will also be impacted.

J Cost \$\$

K Value C+

A2.2

New Enlarged Station at Existing Station Location with Bridge Access

Description of Headhouse Elements

- 1

Total new headhouse provides ability to provide adequately-sized vertical transportation elements and expand the existing cramped free and pay plaza areas.
 - Existing traffic island is enlarged slightly to accept enlarged station area/program
 - Pay plaza remains at mezzanine level
 - With increased station area larger, elevators, stairs, and escalators can be accommodated
- 2/3

Glass-enclosed curbside headhouses with minimum elevator and stair elements.
- 4

Glass-enclosed pedestrian bridges – steel truss structured to minimize overall depth and allow adequate truck clearance of 14’-6” below. Bridges ramp into station headhouse structure and connect to the existing mezzanine pay plaza level.

New Headhouse
Relocated to
Easterly Traffic
Island

Refer to Headhouse Options
B1.0 | B1.1A | B1.1B
B1.1C | B1.2A | B1.2B
B2.0 | B2.1 | B2.2

Design Concept

Developed on an enlarged easterly traffic island directly adjacent to the major pedestrian north/south desire line, new station options were developed with the following parameters:

- ⦿ Expanded site allows station program areas to increase, expanded free and paid plaza areas, enlarged stairs, escalators, and elevator connections to platforms
- ⦿ At grade entry and tunnel options eliminate mezzanine level requirement allowing direct street to platform flow pattern. Bridge connection option requires mezzanine level plaza
- ⦿ New Headhouse locations allow station structure and design to be free of existing rail structure
- ⦿ Improvement to station access and ADA compliance will be maximized and featured in the basic station design
- ⦿ Headhouse relocation requires issues of urban design to be addressed as the station location moves closer to the Charles and Cambridge Street frontage. The urban gateway concept will be explored
- ⦿ Relocation allows upgrades to rail services
- ⦿ Station options will explore at grade, tunnel, and bridge access strategies
- ⦿ Located headhouse in direct path of pedestrian desire lines

Track Alignment Modifications

The rail should be replaced with new 115 RE continuous welded rail, as part of MBTA routine maintenance program. Existing crossties will require spot replacement and re-spacing.

Traffic Modifications / Relocations

While curb lines for traffic islands would change, the traffic pattern would remain virtually unchanged. New traffic signal timing would result.

There is currently a two-lane off-ramp that backs up onto Storrow Drive during peak periods. In the case of at-grade stations, traffic improvements would include a gradual widening of that ramp to three lands, one for left turns under the tracks, one for through moves to Cambridge Street eastbound, and a middle optional lane for either move. The additional lane would provide extra storage to help keep vehicles from backing onto Storrow Drive.

Pedestrian Flow

The additional third lane on the Storrow Drive eastbound off-ramp would result in reduced need for green time which could make a protected pedestrian crossing possible across the south side of Cambridge Street. This would result in a station location accessible at-grade by pedestrians.

Project Factors

A Traffic

Traffic patterns would be similar to existing conditions and signal timing would be modified.

B Barrier-Free Access to the Station

Pedestrian access to station requires an expanded sidewalk/curb line with pedestrian crosswalk signals to allow safe crossing of eastbound Cambridge Street. Access to the station would be provided at-grade with a protected phase.

C Barrier-Free Access within the Station

Assuming fare collection is at grade, the station needs two elevators to provide direct connections to the platforms. The able-bodied pathway is by stairs and escalators. Due to space limits of the site, escalators are only in the up direction. Short ramps connect the top landing of the stair/escalator/elevator complex to the existing platforms west of the proposed station.

D Urban Design

This scheme provides a major improvement to the urban design aspects of the station. The headhouse is no longer visually and physically isolated from the neighborhood. As an object located at the edge of the intersection, the form of the station can become a strong visual conclusion to the river/bridge/city sequence.

E Noise Mitigation

By enclosing more of the track along the curve with station and covered platform access, the physical form of the station begins to control rail noise. Rail noise from the portal to the station could be controlled with passive noise panels added to the faces of the track structure girders. A complete enclosure of this area would be studied with the design of the headhouse structure for optimal benefit.

F Compatibility with the Future Blue Line Extension

Vertical connections down to a tunnel linking the Blue Line extension would have to be constructed. Piggy-backing stairs and escalators would centralize the access path. Tunnel connections are complicated by utility interference within the intersection.

G Track

Existing track layout remains. Updates to power and signal are required to meet code and operations standards.

H Platform

The station location provides an opportunity to enlarge the easterly ends of the platforms to allow improved crowd egress during special events.

I Constructability

Constructability is enhanced over “A” station schemes, as existing station headhouse and bridges can be kept in full operation during the construction period. As a result, this will reduce costs.

J Cost \$\$

K Value B

B 1.0

New Station at Cambridge Street Island with At-Grade Access

Description of Headhouse Elements

- 1

Totally new headhouse, located on pedestrian desire lines, provide the opportunity to locate the station closer to natural crossing points. Fare plaza is located at grade with elevator, stair, and escalator access to platforms.
- 2

At-grade pedestrian crossings would be provided.
- 3

Curb line would be built out to reduce pedestrian crossing distance.
- 4

Storrow Drive eastbound off-ramp is widened to three lanes.

B 1.1A
New Station at
Cambridge Street
Island with
Tunnel Access
(Option A)

Project Factors

- A Traffic
Traffic pattern and signaling remain unchanged.
- B Barrier-Free Access to the Station
Tunnel pathway avoids issues of surface traffic, however, tunnels are long and unsupervised, thus a potential for criminal activity that will discourage their use and use of the station. Due to utilities, tunnels are deep, say +/- 35' from street to floor level, requiring escalators, elevators, and adding to the climb to the above ground platforms.
- C Barrier-Free Access within the Station
Access from street level to platform requires two elevator rides – street to tunnel, then tunnel to platform.
- D Urban Design
This scheme provides a major improvement to the urban design aspects of the station. The headhouse is no longer visually and physically isolated from the neighborhood. As an object located at the edge of the intersection, the form of the station can become a strong visual conclusion to the river/bridge/city sequence. However, curbside headhouses add little to the neighborhood as isolated elements. The possibility of blending the northerly headhouse into future MGH development would greatly improve the neighborhood fit and improve security.
- E Noise Mitigation
By enclosing more of the track along the curve with station and covered platform access, the physical form of the station begins to control rail noise. Rail noise from the portal to the station could be controlled with passive noise panels added to the faces of the track structure girders. A complete enclosure of this area would be studied with the design of the headhouse structure for optimal benefit.
- F Compatibility with the Future Blue Line Extension
Tunnel connections to the Charles/MGH station would be directly linked to the Blue Line extension tunnel. Knock out panels constructed within the tunnel walls would facilitate phased connections between the two projects.
- G Track
Existing track layout remains. Updates to power and signal are required to meet code and operations standards.
- H Platform
Existing platform is retained. Upgrades to finishes and general repairs are required to extend serviceable life and update appearance.
- I Constructability
Constructability is enhanced over “A” station schemes, as existing station headhouse and bridges can be kept in full operation during the construction period. As a result, this will reduce costs. Construction of pedestrian tunnels adds to the cost and complexity of this option. Major impacts to existing utilities require complex relocation and staging. While the station itself remains free of existing traffic, tunnel construction will involve phased construction and general disruptions to traffic flow in the intersection. Existing bridges to station should remain in service during tunnel construction activity.

Description of Headhouse Elements

1

Totally new headhouse fills the easterly traffic island. This option assumes that existing traffic patterns remain unchanged. As such, curbside headhouses provide access to a pedestrian tunnel below grade with fare collection at this level.

2/3

Glass enclosed curbside headhouse with minimum elevator and stair elements.

4

Pedestrian tunnels with standard MBTA finishes. Tunnel locations below grade governed by existing utilities. Water table near surface requires slurry wall type construction.

Project Factors

A Traffic

Traffic pattern and signaling remain unchanged.

B Barrier-Free Access to the Station

Tunnel pathway avoids issues of surface traffic, however, tunnels are long and unsupervised, thus a potential for criminal activity that will discourage their use and use of the station. Due to utilities, tunnels are deep, say +/- 35' from street to floor level, requiring escalators, elevators, and adding to the climb to the above ground platforms.

C Barrier-Free Access within the Station

Access from street level to platform requires two elevator or escalator rides – street to tunnel, then tunnel to platform.

D Urban Design

This scheme provides a major improvement to the urban design aspects of the station. The headhouse is no longer visually and physically isolated from the neighborhood. As an object located at the edge of the intersection, the form of the station can become a strong visual conclusion to the river/bridge/city sequence. However, curbside headhouses add little to the neighborhood as isolated elements. The possibility of blending the northerly headhouse into future MGH development would greatly improve the neighborhood fit and improve security.

E Noise Mitigation

By enclosing more of the track along the curve with station and covered platform access, the physical form of the station begins to control rail noise. Rail noise from the portal to the station could be controlled with passive noise panels added to the faces of the track structure girders. A complete enclosure of this area would be studied with the design of the headhouse structure for optimal benefit.

F Compatibility with the Future Blue Line Extension

Tunnel connections to the Charles/MGH station would be directly linked to the Blue Line extension tunnel. Knock-out panels constructed within the tunnel walls would facilitate phased connections between the two projects.

G Track

Existing track layout remains. Updates to power and signal are required to meet code and operations standards.

H Platform

Existing platform is retained. Upgrades to finishes and general repairs are required to extend serviceable life and update appearance.

I Constructability

Constructability is enhanced over “A” station schemes, as existing station headhouse and bridges can be kept in full operation during the construction period. As a result, this will reduce costs. Construction of pedestrian tunnels adds to the cost and complexity of this option. Major impacts to existing utilities require complex relocation and staging. While the station itself remains free of existing traffic, tunnel construction will involve phased construction and general disruptions to traffic flow in the intersection. Existing bridges to station should remain in service during tunnel construction activity.

J Cost \$\$\$

K Value C-

B1.1B

New Station at
Cambridge Street
Island with
Tunnel Access
(Option B)

Description of Headhouse Elements

- 1

Totally new headhouse fills the easterly traffic island. This option assumes that existing traffic patterns remain unchanged. As such, curbside headhouses provide access to a pedestrian tunnel below grade with fare collection at this level.
- 2/3

Glass enclosed curbside headhouse with minimum elevator and stair elements. Expanded curb line for headhouse site.
- 4

Pedestrian tunnels with standard MBTA finishes. Tunnel locations below grade governed by existing utilities. Water table near surface requires slurry wall-type construction.

New Station at
Cambridge Street
Island with
Tunnel Access
(Option C)

B 1.1C

Project Factors

- A Traffic
Traffic pattern and signaling remain unchanged.
- B Barrier-Free Access to the Station
Tunnel pathway avoids issues of surface traffic, however, tunnels are long and unsupervised, thus a potential for criminal activity that will discourage their use and use of the station. Due to utilities, tunnels are deep, say +/- 35' from street to floor level, requiring escalators, elevators, and adding to the climb to the above ground platforms.
- C Barrier-Free Access within the Station
Access from street level to platform requires two elevator rides – street to tunnel, then tunnel to platform.
- D Urban Design
This scheme provides a major improvement to the urban design aspects of the station. The headhouse is no longer visually and physically isolated from the neighborhood. As an object located at the edge of the intersection, the form of the station can become a strong visual conclusion to the river/bridge/city sequence. Headhouse elements blend into proposed future MGH development and extend the historic fabric at Charles Street.
- E Noise Mitigation
By enclosing more of the track along the curve with station and covered platform access, the physical form of the station begins to control rail noise. Rail noise from the portal to the station could be controlled with passive noise panels added to the faces of the track structure girders. A complete enclosure of this area would be studied with the design of the Head House structure for optimal benefit.
- F Compatibility with the Future Blue Line Extension
Tunnel connections to the Charles/MGH station would be directly linked to the Blue Line extension tunnel. Knock out panels constructed within the tunnel walls would facilitate phased connections between the two projects.
- G Track
Existing track layout remains. Updates to power and signal are required to meet code and operations standards.
- H Platform
Existing platform is retained. Upgrades to finishes and general repairs are required to extend serviceable life and update appearance.
- I Constructability
Constructability is enhanced over “A” station schemes, as existing station Head House and bridges can be kept in full operation during the construction period. As a result, this will reduce costs. Construction of pedestrian tunnels adds to the cost and complexity of this option. Major impacts to existing utilities require complex relocation and staging. While the station itself remains free of existing traffic, tunnel construction will involve phased construction and general disruptions to traffic flow in the intersection. Existing bridges to station should remain in service during tunnel construction activity. Land taking of CVS site increases cost of this option.

J Cost \$\$\$\$ K Value C

- Description of Headhouse Elements
- 1

Totally new headhouse fills the easterly traffic island. This option assumes that existing traffic patterns remain unchanged. As such, curbside headhouses provide access to a pedestrian tunnel below grade with fare collection at this level.
- 2

Glass enclosed curbside headhouse with minimum elevator and stair elements.
- 3

Headhouse 3 replaces the CVS store and becomes part of the streetscape edge.
- 4

Pedestrian tunnels with standard MBTA finishes. Tunnel locations below grade governed by existing utilities. Water table near surface requires slurry wall type construction.
- 5

CVS site is completed with a new retail space adjacent to the headhouse 3 entry. The design of elements 3 and 5 combine to produce a compatible architecture within the Historic District.

Project Factors

A Traffic

Traffic pattern and signaling remain unchanged.

B Barrier-Free Access to the Station

Remote headhouses provide escalator, stair, and elevator connections to the bridge structure above. With the pay plaza above the train, increasing vertical travel, it is necessary to provide escalators in both directions.

C Barrier-Free Access within the Station

Access is provided in the remote headouses by elevators to the bridge structure. Elevators down from the pay plaza to the platforms complete the accessible pathway.

D Urban Design

An over the track station becomes a visual gateway or a monster that looms above the street. Developed to full advantage, the station has views of the river, becomes a gateway feature and marks the station in the landscape.

E Noise Mitigation

By enclosing more of the track along the curve with station and covered platform access, the physical form of the station begins to control rail noise. Rail noise from the portal to the station could be controlled with passive noise panels added to the faces of the track structure girders. A complete enclosure of this area would be studied with the design of the headhouse structure for optimal benefit.

F Compatibility with the Future Blue Line Extension

Blue Line connections are only feasible into the base of remote Headhouse 2 on the north side of Cambridge Street.

G Track

Existing track layout remains. Updates to power and signal are required to meet code and operations standards.

H Platform

Easterly ends of the platform could be widened to ease entry and exiting moves by travelers.

I Constructability

Constructability is enhanced over “A” station schemes, as existing station headhouse and bridges can be kept in full operation during the construction period. As a result, this will reduce costs. Long span bridge elements will require weekend or off-hour placement to reduce impacts to traffic. Land taking of CVS site increases cost of this option.

J Cost \$\$ K Value B-

Description of Headhouse Elements

- 1

Pay lobby and free passage circulation are on levels above the train. The station becomes one story taller than the existing station. The station, in effect, spans over the train.
- 2/3/5

Headhouse elements are three-story structures matching the existing street massing or blending into future development at MGH. Headhouse 3 replaces the CVS store.
- 4

Pedestrian bridges – steel truss structures span the street well above the traffic and above local sight planes. In the architectural development of the bridge design on this option, a gentle continuous curve could be developed to produce a large scale entry wall to the city.

B 1.2A

New Station at
Cambridge Street
Island with
Bridge Access
(Option A)

B 1.2B

Project Factors

New Station at
Cambridge Street
Island with
Bridge Access
(Option B)

A Traffic

Traffic pattern and signaling remain unchanged.

B Barrier-Free Access to the Station

Remote headhouses provide escalator, stair, and elevator connections to the bridge structure above. With the pay plaza above the train, increasing vertical travel, it is necessary to provide escalators in both directions.

C Barrier-Free Access within the Station

Access is provided in the remote headhouses by elevators to the bridge structure. Elevators down from the pay plaza to the platforms complete the accessible pathway.

D Urban Design

An over-the-track station becomes a visual gateway or a monster that looms above the street. Developed to full advantage, the station has views of the river, becomes a gateway feature and marks the station in the landscape.

E Noise Mitigation

By enclosing more of the track along the curve with station and covered platform access, the physical form of the station begins to control rail noise. Rail noise from the portal to the station could be controlled with passive noise panels added to the faces of the track structure girders. A complete enclosure of this area would be studied with the design of the headhouse structure for optimal benefit.

F Compatibility with the Future Blue Line Extension

Blue Line connections are only feasible into the base of remote headhouse 2 on the north side of Cambridge Street.

G Track

Existing track layout remains. Updates to power and signal are required to meet code and operations standards.

H Platform

Easterly ends of the platform could be widened to ease entry and exiting moves by travelers.

I Constructability

Constructability is enhanced over the “A” station schemes, as existing station headhouse and bridges can be kept in full operation during the construction period. As a result, this will reduce costs. Long span bridge elements will require weekend or off-hour placement to reduce impacts to traffic.

J Cost \$\$

K Value B

Description of Headhouse Elements

- 1**Pay lobby and free passage circulation are on levels above the train. The station becomes one story taller than the existing station. The station spans over the train.
- 2/3**Headhouse elements are three-story structures matching the existing street massing or blending into future development facades at MGH.
- 4**Pedestrian bridges – steel truss structures span the street well above the traffic and above local sight planes. In the architectural development of the bridge design on this option, a gentle continuous curve could be developed to produce a large scale entry wall to the city.

B2.0

New Station at
Enlarged Cambridge
Street Island with
At-Grade Access

Project Factors

A Traffic

Although traffic islands shift slightly to the west, traffic patterns remain virtually unchanged. Traffic signal phasing would include a pedestrian phase.

B Barrier-Free Access to the Station

Pedestrian access to the station is direct, at-grade, with protected crossing of eastbound and westbound Cambridge Street. Path of station travel and desire lines are the same.

C Barrier-Free Access within the Station

Disabled persons and all other pedestrian movements on the island and from lobby to platform are enhanced due to the additional space available on the enlarged island. There is room for up and down escalators, larger than minimum elevators, and wide stairs. A short ramp connects the landing at the top of the stair/escalator/elevator ensemble to the end of the platforms. There is generous space for pedestrian circulation on the island inside and outside of the headhouse.

D Urban Design

The headhouse is part of the neighborhood and offers the opportunity to be a significant urban design element forming a gateway for travelers passing on foot and in vehicles in all directions through the site. Pedestrian amenities, like those provided in Harvard Square, would be incorporated in the streetscape. As the design develops, it is important that the station retains an open, dynamic quality vs. a static, stopper-like image.

E Noise Mitigation

By enclosing more of the track along the curve with station and covered platform access, the physical form of the station begins to control rail noise. Rail noise from the portal to the station could be controlled with passive noise panels added to the faces of the track structure girders. A complete enclosure of this area would be studied with the design of the Head House structure for optimal benefit.

F Compatibility with the Future Blue Line Extension

Vertical connections down to a tunnel linking the Blue Line extension would have to be constructed. Piggybacking stairs and escalators would centralize the access path. Tunnel connections are complicated by utility interference within the intersection.

G Track

Modifications to track supports – piers would enhance and improve the flow through the station. One pier, located in the new station, would be replaced with columns to allow pedestrian circulation in the fare collection area.

H Platform

Easterly ends of the platform could be widened to ease entry and exiting moves by travelers.

I Constructability

As this scheme eliminates the existing headhouse, various temporary measures are necessary to keep the station open for use and to maintain vehicular traffic. For example, four lanes can be filled in between existing piers, and two temporary U-turn lanes can be created just east of the island. Thus, the existing headhouse would stay in service while the new one is being built. Careful review of existing utilities needs to be addressed in the design process to reduce or eliminate the need to relocate major utility lines and branches.

J Cost \$\$+

K Value B+ to A

Description of Headhouse Elements

- 1/4
- Station island configuration requires reconstruction of roadway system, though the traffic flow pattern and capacity will be similar to the existing layout. The roadway between the existing Red Line piers is eliminated and a new roadway will be located between piers to the west, the site of the existing headhouse. The islands will be reconfigured to suit the shift of these roadways toward the west. The enlarged Cambridge Street island extends from existing piers 4 to 6.
- 2/3
- Curb line is modified to allow at-grade access to the station with pedestrian crossing signal.
- 5
- Storrow Drive eastbound off-ramp is widened to three lanes

New Station at
Enlarged Cambridge
Street Island with
Tunnel Access

B 2.1 Project Factors

A Traffic

Although traffic islands shift slightly to the west, traffic patterns remain virtually unchanged.

B Barrier-Free Access to the Station

Pedestrian access to the station is direct in the horizontal plane, but requires a lot more up and down movement, common to all the tunnel alternatives. Fare collection lobby would be in tunnel. Due to utilities, tunnels are deep, say +/- 35' from street to floor level, requiring escalators, elevators, and adding to the climb to the above ground platforms.

C Barrier-Free Access within the Station

Disabled persons' access is via elevator from street to tunnel – elevator from tunnel to platform assuming pay plaza is at tunnel level.

D Urban Design

The headhouse is part of the neighborhood and offers the opportunity to be a significant urban design element forming a gateway for travelers passing on foot and in vehicles in all directions through the site. As the design develops, it is important that the station retains an open, dynamic quality vs. a static, stopper-like image. Street side headhouses add little to the neighborhood as isolated elements. The possible blending of the northerly headhouse with future MGH development would improve this issue somewhat.

E Noise Mitigation

By enclosing more of the track along the curve with station and covered platform access, the physical form of the station begins to control rail noise. Rail noise from the portal to the station could be controlled with passive noise panels added to the faces of the track structure girders. A complete enclosure of this area would be studied with the design of the Head House structure for optimal benefit.

F Compatibility with the Future Blue Line Extension

Tunnel connections to the Charles/MGH station would be directly linked to the Blue Line extension tunnel. Knock-out panels constructed within the tunnel walls would facilitate phased connections between the two projects.

G Track

Existing track layout remains. Updates to power and signal are required to meet code and operations standards.

H Platform

Easterly ends of the platform could be widened to ease entry and exiting moves by travelers.

I Constructability

As this scheme eliminates the existing headhouse, various temporary measures are necessary to keep the station open for use and to maintain vehicular traffic. For example, four lanes can be filled in between existing piers, and two temporary U-turn lanes can be created just east of the island. Thus, the existing headhouse would stay in service while the new one is being built. Major impacts to existing utilities require complex relocation and staging. Tunnel construction activity will have a major additional impact on traffic and the neighborhood.

J Cost \$\$\$\$ K Value B-

Description of Headhouse Elements

- 1/4 Station island configuration requires reconstruction of roadway system, though the traffic flow pattern and capacity will be similar to the existing layout. The roadway between existing Red Line piers is eliminated. A new roadway will be located between existing piers to the west, the site of the existing headhouse. The islands will be reconfigured to suit the shift of these roadways toward the west. The enlarged Cambridge Street island extends from pier 4 to pier 6.
- 2 Glass enclosed curbside headhouse with minimum elevator and stair elements.
- 3 Pedestrian tunnels with standard MBTA finishes. Tunnel locations below grade governed by existing utilities. Water table near surface requires slurry wall type construction.
- 5 Curb line relocated to allow for remote headhouse access to pedestrian tunnels.

Project Factors

A Traffic

Although traffic islands shift slightly to the west, traffic patterns remain virtually unchanged.

B Barrier-Free Access to the Station

Access pattern to station is similar to existing bridge/stair path, however, pedestrian access is improved by more direct, wider, and fully enclosed bridges. Through truss design reduces climbing distances. Elevators from street to bridge level and ramps from bridge to lobby level greatly improve access to facility.

C Barrier-Free Access within the Station

Disabled persons’ access follows the able-bodied path as described above, plus elevators and stairs at the street entry to the bridges. A short ramp connects the landing at the top of the stair/escalator/elevator ensemble from the lobby to the end of the platforms, as in B2.0.

D Urban Design

The headhouse is part of the neighborhood and offers the opportunity to be a significant urban design element forming a gateway for travelers passing on foot and in vehicles in all directions through the site. As the design develops, it is important that the station retains an open, dynamic quality vs. a static, stopper-like image. The bridges plus their street access structures will make a true gateway at the termination of Cambridge Street.

E Noise Mitigation

By enclosing more of the track along the curve with station and covered platform access, the physical form of the station begins to control rail noise. Rail noise from the portal to the station could be controlled with passive noise panels added to the faces of the track structure girders. A complete enclosure of this area would be studied with the design of the headhouse structure for optimal benefit.

F Compatibility with the Future Blue Line Extension

Blue Line connections are only feasible into the base of remote headhouse 2 on the north side of Cambridge Street.

G Track

Modifications to track supports – piers would enhance and improve the flow through the station. Pier 5 needs to be replaced with columns to allow pedestrians circulation in the fare collection area.

H Platform

Easterly ends of the platform could be widened to ease entry and exiting moves by travelers.

I Constructability

As this scheme eliminates the existing headhouse, various temporary measures are necessary to keep the station open for use and to maintain vehicular traffic. For example, four lanes can be filled in between existing piers, and two temporary U-turn lanes created just east of the island. Thus, the existing headhouse would stay in service while the new one is being built. Careful review of existing utilities needs to be addressed in the design process to reduce or eliminate the need to relocate major utility lines and branches. Long span bridge elements would require weekend or off-hour placement to reduce traffic impacts.

J Cost \$\$\$ K Value B

Description of Headhouse Elements

- 1
- Assuming fare collection is at the mezzanine level, two elevators in a supervised location provide direct connections to the platforms. The able-bodied pathway is provided by stairs and escalators (up only) to and from the mezzanine level and the platforms. With an expanded station area, a more gracious stair and stair landing can be developed.
- 2
- Glass enclosed curbside headhouse with minimum elevator and stair elements.
- 3
- Glass enclosed pedestrian bridges – steel truss structured to minimize overall depth and allow adequate truck clearances below. Bridges ramp into station headhouse structure and connect to the mezzanine pay plaza level.
- 4/5
- Station island configuration requires reconstruction of roadway system, though the traffic flow pattern and capacity will be similar to the existing layout. The roadway between existing Red Line piers is eliminated and a new roadway will be located between piers to the west, the site of the existing headhouse. The islands will be reconfigured to suit the shift of these roadways toward the west. The enlarged Cambridge Street island extends from pier 4 to pier 6.

B2.2

New Station at Enlarged Cambridge Street Island with Bridge Access

New Headhouse
at West Cedar Street
and Lindall Place

Refer to Headhouse Options
C1.0 | C1.1 | C1.2

Design Concept

On the MBTA owned Cambridge Street/Lindall Place property (currently used as a parking lot) combined with the adjacent privately owned, two-story office property on West Cedar Street, this option was developed with the following parameters:

- ⦿ The West Cedar Street property would be taken by eminent domain
- ⦿ Rail super structure from the Lindall Place abutment to the pier at the West Cedar Street corner would be reconstructed
- ⦿ Retail street frontage would be maximized
- ⦿ Direct pathways to MGH via tunnel or bridge will be explored
- ⦿ Station design will hold the street line along Cambridge Street and will be compatible in massing and scale to structures on the south side (Beacon Hill) of Cambridge Street
- ⦿ The free and paid plaza level of the station would be at-grade or above the train structure, freeing the street for retail uses and permitting an upper level, above Cambridge Street connection to proposed MGH developments

C 1.0

New Station at
West Cedar Street
with At-Grade Access

Project Factors

A Traffic

Traffic pattern and signaling remain unchanged.

B Barrier-Free Access to the Station

Pedestrian access includes new pedestrian crossing as described above plus increase in pedestrian activity at existing West Cedar Street/Cambridge Street intersection. Unfortunately the major generators of pedestrian traffic are north of Cambridge Street while the headhouse is on the south side. Travelers from the Charles Street area have somewhat longer travel distances than the existing condition.

C Barrier-Free Access within the Station

Disabled and able-bodied users of the station will use stairs, up escalators, and elevators to go from street level to the long ramps leading up to the platforms. The ramps, up to 300 feet long, create a lengthy “walkback” to the station. To fit the stairs and escalators within limited space, part of the lobby floor has to be about three feet above street level. The ramps to the platform, running along each side of the track bridge, will be rising toward the platform on a gentle 4% grade.

D Urban Design

As an infill structure the station completes the street elevation along Cambridge Street. In doing so it provides security to West Cedar Street and along the southwest end of Cambridge Street. The headhouse at grade and the flanking ramps leading to the existing platform effectively hide the track structure and act as an effective sound barrier. Cambridge Street, covered with a 65-foot-wide soffit, may be gloomy. The existing headhouse functions – not being required - can be reduced to emergency stairs, greatly reducing the impact of the station in the intersection.

E Noise Mitigation

By completely shielding the rail structure from Lindall Place to the existing easterly end of the platform, the physical design of the station effectively controls rail noise. Passive sound control panels added to the rail girders would reduce noise within the station area and platform enclosure.

F Compatibility with the Future Blue Line Extension

Vertical connections down to a tunnel linking the Blue Line extension would have to be constructed. Piggybacking stairs and escalators would centralize the access path. Tunnel connections are complicated by utility interference within the intersection.

G Track

The viaduct between Cambridge Street and Lindall Place will have to be reconstructed to allow for construction of the headhouse. Fortunately this work would have only minor impact on Cambridge Street at West Cedar Street. Early evening and weekend shut-downs of the Red Line would be needed to carry out the reconstruction of this 150' long viaduct section. The property at the north end of West Cedar Street, a small 1940's office building will have to be taken in order to make room for station elements.

H Platform

Ramps from the proposed station, approximately 300 feet in length, join the existing platform at the easterly side.

I Constructability

As described in element G, the viaduct between Cambridge Street and Lindall Place will have to be reconstructed - challenging, but not impossible or out of the question. Other construction activities have minimal impact or disruption to the Red Line or the general community.

J Cost \$\$\$\$

K Value B

Description of Headhouse Elements

- 1

Derelict property under Red Line structure at West Cedar Street and Lindall Place is replaced with a station headhouse with pay plaza at grade, vertical circulation hugs the sides of existing track alignment.
- 2/3

Signal turning modifications are added to intersections providing a phased crossing of traffic for pedestrian access across Cambridge Street to the station.
- 4

Ramp connections to existing easterly ends of existing platforms.

New Station at
West Cedar Street
with Tunnel Access
to MGH/MEEI
District Area

C1.1 Project Factors

A Traffic

No modifications to traffic required.

B Barrier-Free Access to the Station

Pedestrian access to station is at grade via pedestrian crosswalks and by below-grade tunnel connecting points north.

C Barrier-Free Access within the Station

Disabled and able-bodied users of the station will use stairs, up escalators, and elevators to go from street level to the long ramps leading up to the platforms. The ramps, up to 300 feet long, create a lengthy “walkback” to the station. To fit the stairs and escalators within limited space, part of the lobby floor has to be about 3’ above street level. The ramps to the platform running along each side of the track bridge will be rising toward the platform on a gentle 4% grade. Travelers using the tunnel require more up and down moves than at grade entry travelers. Security/surveillance is a problem, as the fare collection lobby has to be at street level for the convenience of riders accessing the station from the south side of Cambridge Street.

D Urban Design

As an infill structure, the station completes the street elevation along Cambridge Street. In doing so it provides security to West Cedar Street and along the southwest end of Cambridge Street. The headhouse at grade and the flanking ramps leading to the existing platform effectively hide the track structure and act as an effective sound barrier. Cambridge Street, covered with a 65 foot wide soffit, may be gloomy. The existing headhouse functions – not being required - can be reduced to emergency stairs, greatly reducing the impact of the station in the intersection.

E Noise Mitigation

By completely shielding the rail structure from Lindall Place to the existing easterly end of the platform, the physical design of the station effectively controls rail noise. Passive sound control panels added to the rail girders would reduce noise within the station area and platform enclosure.

F Compatibility with the Future Blue Line Extension

Tunnel connections to the Charles/MGH station would be directly linked to the Blue Line extension tunnel. Knock-out panels constructed within the tunnel walls would facilitate phased connections between the two projects.

G Track

The viaduct between Cambridge Street and Lindall Place will have to be reconstructed to allow for construction of the headhouse. Fortunately this work would have only minor impact on Cambridge Street at West Cedar Street. Early evening and weekend shut-downs of the Red Line would be needed to carry out the reconstruction of this 150’ long viaduct section. The property at the north end of West Cedar Street, a small 1940’s office building will have to be taken in order to make room for station elements.

H Platform

Ramps from the proposed station, approximately 300 feet in length, join the existing platform at the easterly side.

I Constructability

As described in element G, the viaduct between Cambridge Street and Lindall Place will have to be reconstructed - challenging, but not impossible or out of the question. For tunnel access, major impacts to existing utilities would require complex relocation and staging. Other construction activities have minimal impact or disruption to the Red Line or the general community.

Description of Headhouse Elements

- 1
- Derelict property under Red Line structure at West Cedar Street and Lindall Place is replaced with a station headhouse with pay plaza at grade, vertical circulation hugs the sides of existing track alignment. Pedestrian tunnel connects the north side of Cambridge Street to station.
- 2
- Glass enclosed curbside headouse with frontage to MGH has stair and elevator connections to pedestrian tunnel.
- 3
- Pedestrian tunnels with standard MBTA finishes. Tunnel locations below grade governed by existing utilities. Water table near surface requires slurry wall type construction. Possible below grade connections to MGH facilities.

C 1.2

New Station at
West Cedar Street
with Bridge Access
to MGH/MEEI
District Area

Project Factors

A Traffic

No modifications to traffic required.

B Barrier-Free Access to the Station

Pedestrian access from north side of Cambridge Street via high level pedestrian bridge, about 35’ above the street. Requires up and down escalators, plus stair and elevator at hospital site with access, possibly at an above grade level, and to the street. Same vertical circulation required at headhouse on south side of the street, connecting the above track lobby, to the street.

C Barrier-Free Access within the Station

Disabled persons’ access to the bridge and lobby by elevator (scheme needs only two elevators and four escalators). The 300’ long ramps lead down to platform level, from the lobby on a +/- 4.5% grade. The space below the lobby and tracks could be developed for commercial activity, as well as providing station services.

D Urban Design

The ramps along each side of the viaduct will be higher than those in C1.0. Cambridge Street, covered with a 65 foot wide soffit, may be gloomy. The ramps, plus the lobby over the track, provide more sound isolation. The high pedestrian bridge over Cambridge Street will form a major gateway element, but being high it provides a better view under it than a lower pedestrian bridge. The headhouse being high will be in character with other multi-story buildings along Cambridge Street. This scheme, like C1.0, puts the Head House somewhat deeper into the neighborhood to the east than the A and B schemes which are further west, closer to Charles Street and the river. Direct connections to the hospital area are a real plus.

E Noise Mitigation

By completely shielding the rail structure from Lindall Place to the existing easterly end of the platform, the physical design of the station effectively controls rail noise. Passive sound control panels added to the rail girders would reduce noise within the station area and platform enclosure.

F Compatibility with the Future Blue Line Extension

Vertical connections down to a tunnel linking the Blue Line extension would have to be constructed. Piggybacking stairs and escalators would centralize the access path. Tunnel connections are complicated by utility interference within the intersection.

G Track

The viaduct between Cambridge Street and Lindall Place will have to be reconstructed to allow for construction of the Head House. Fortunately this work would have only minor impact on Cambridge Street at West Cedar Street. Early evening and weekend shut-downs of the Red Line would be needed to carry out the reconstruction of this 150’ long viaduct section. The property at the north end of West Cedar Street, a small 1940’s office building will have to be taken in order to make room for station elements.

H Platform

Ramps from the proposed station join the existing platform at the easterly side.

I Constructability

As described in element G, the viaduct between Cambridge Street and Lindall Place will have to be reconstructed - challenging, but not impossible or out of the question. Other construction activities have minimal impact or disruption to the Red Line or the general community.

J Cost \$\$\$\$

K Value B

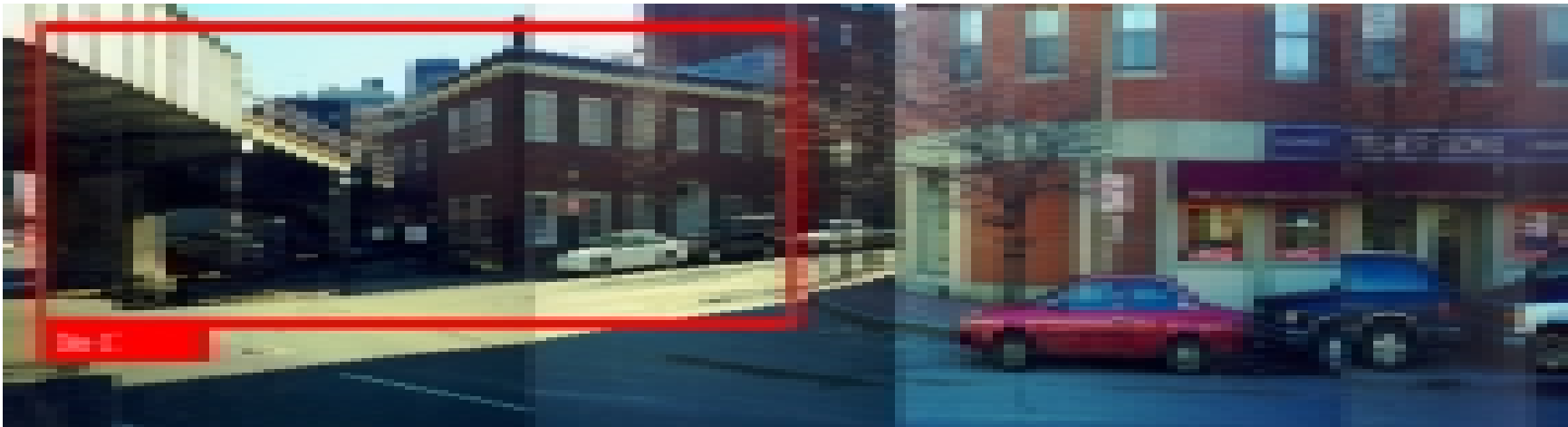
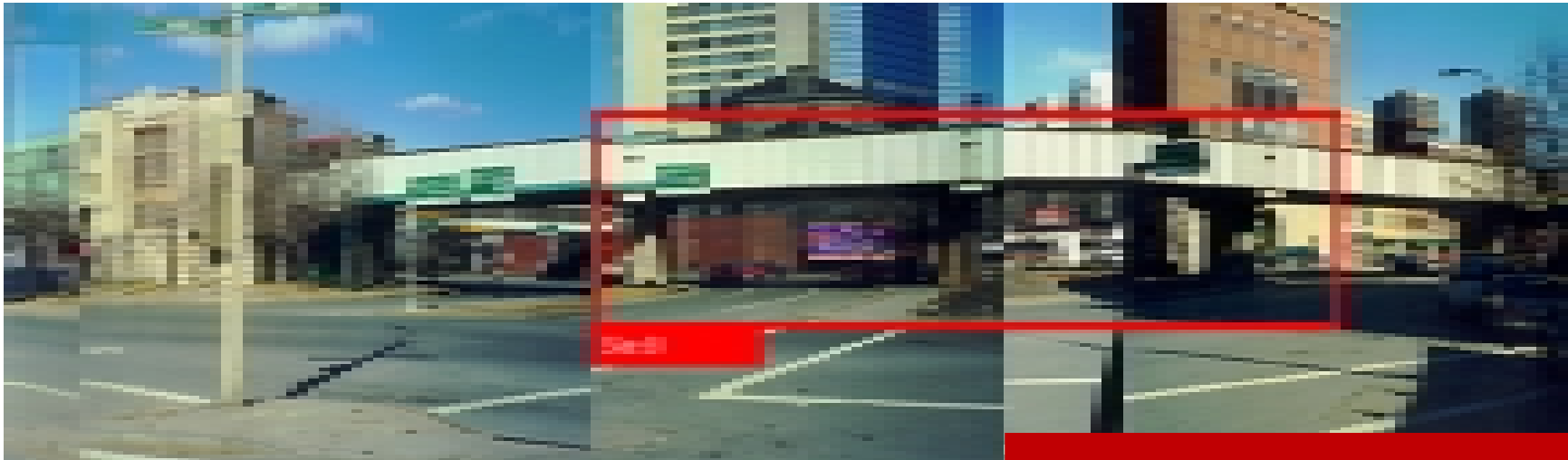
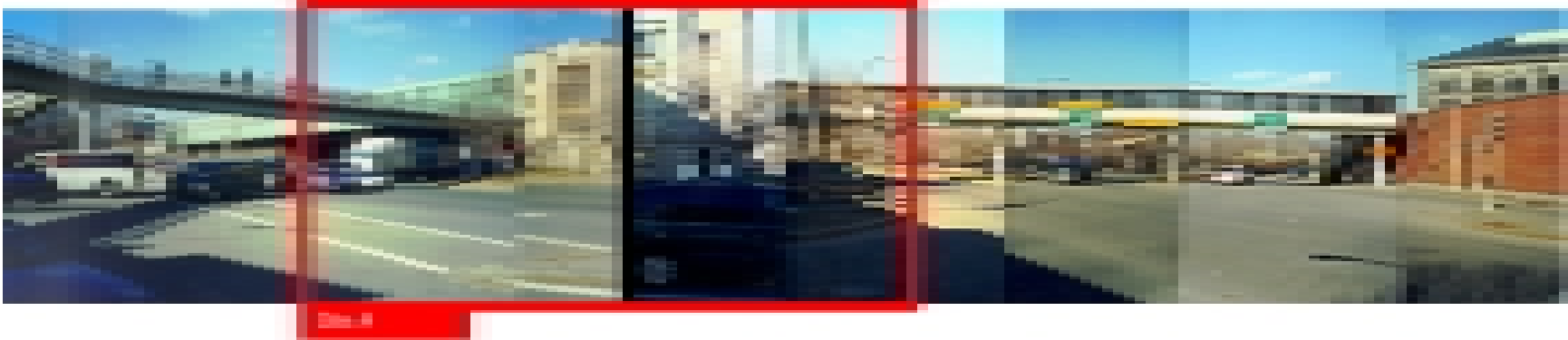
Description of Headhouse Elements

- 1

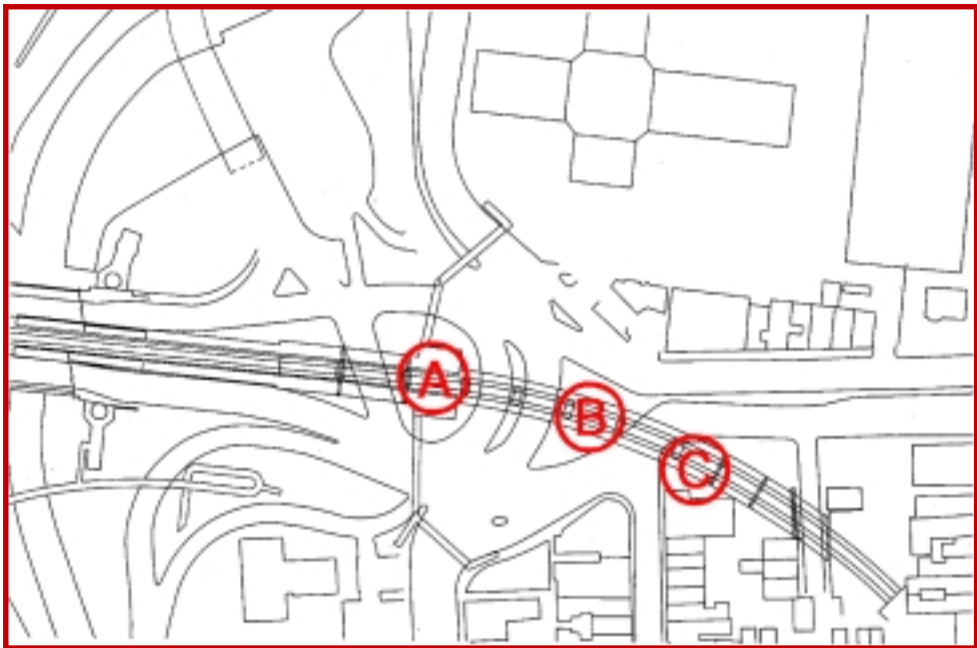
Red Line track at the corner of West Cedar Street and Lindall Place is spanned and enclosed with a station headhouse structure with entry at grade and pay plaza level above the Red Line. Ramps running parallel to the track structure connect the station to the easterly ends of the existing platforms.
- 2

Vertical core at the future MGH development with stairs, elevators, and escalators connect to bridge leading to the headhouse structure.
- 3

Long span bridge connects MGH/north side of Cambridge Street to pay/free plaza level at station.



Development of Three Options



In selecting three options for further development it is important to consider options which will address a wide range of project issues. Each option selected deals with project scope, budget, traffic, image, and overall function in a completely different manner. Exploring options in this manner, the MBTA maintains flexibility within the complexities of the project and the site.

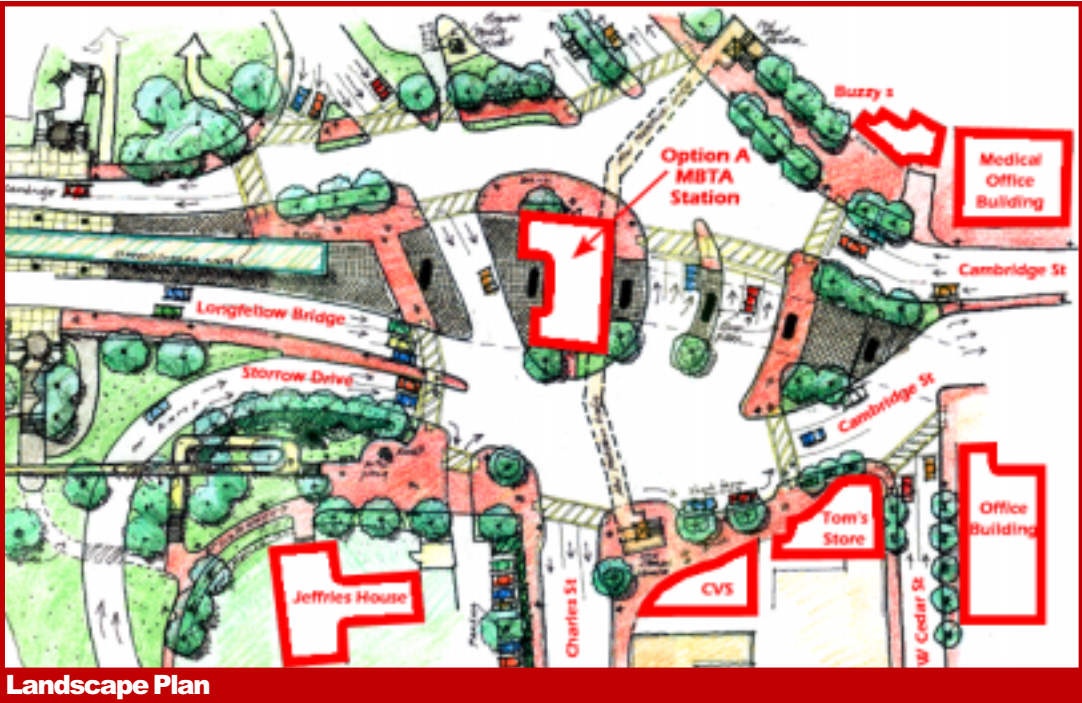
All options meet the federal mandate of ADA access and provide varying degrees of service improvements to the station and its environs. The most notable difference in the options pertains to station location and the resulting issues of traffic modifications and pedestrian access improvements within the intersection.

Selected Options

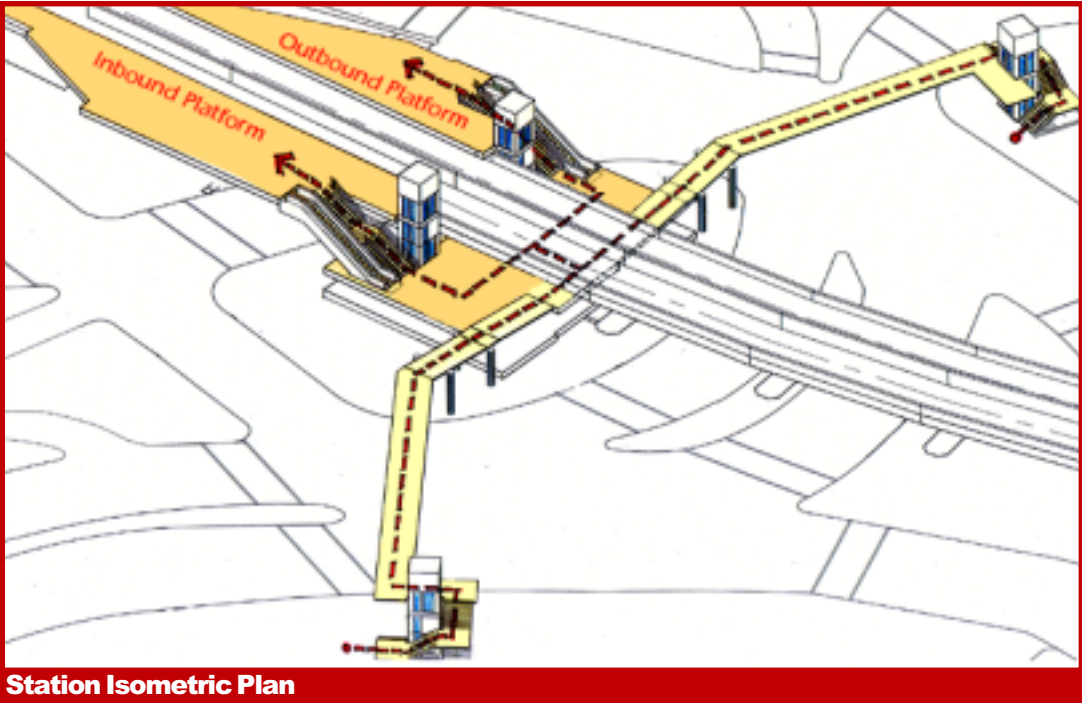
- A1.2 Major Rehab to Station at Existing Location with Pedestrian Bridge Access
- B2.0 New Station at Enlarged Cambridge Street Island with At-Grade Access
- C1.2 New Station at West Cedar Street with Bridge Access to MGH/MEEI District Area

Option A1.2

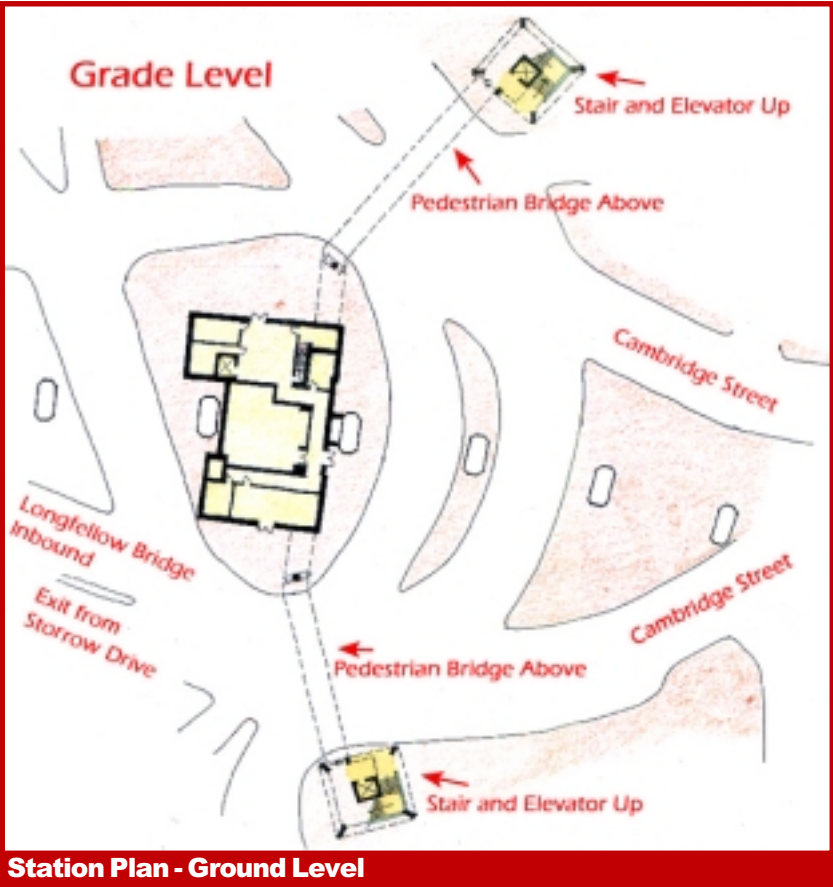
Major rehabilitation to station at existing location with pedestrian bridge access



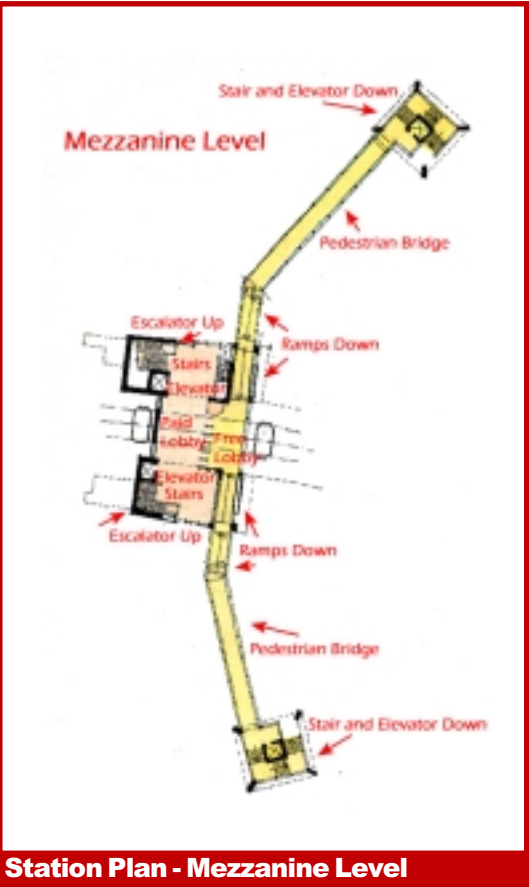
Landscape Plan



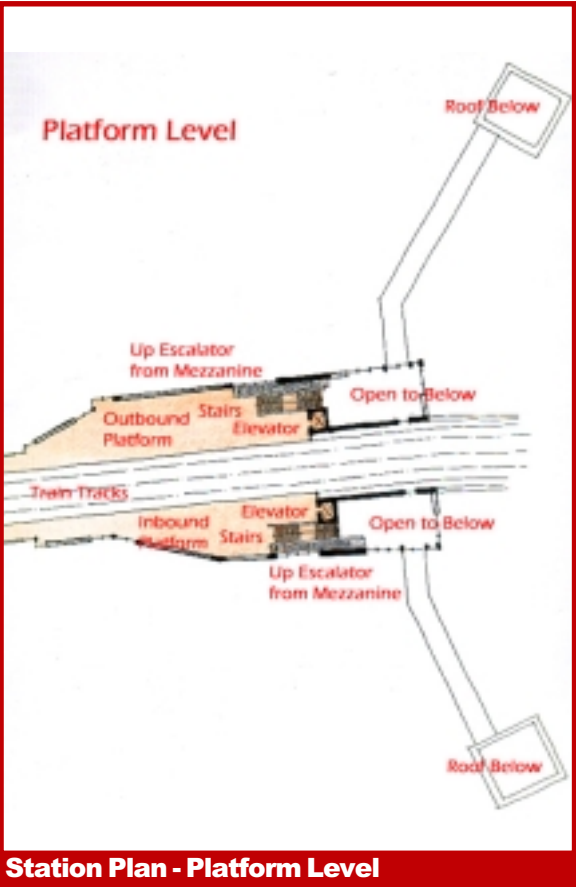
Station Isometric Plan



Station Plan - Ground Level



Station Plan - Mezzanine Level



Station Plan - Platform Level

Evaluation

Option A1.2
Project Alternative

PROS

- Retains historic location of headhouse
- Existing traffic patterns do not need to be modified (no improvements to pedestrian access across intersection are achieved)
- Construction scope and cost is moderate
- ADA access is achieved to station
- Links to future MGH are possible
- Track modifications are not required

CONS

- Improvements to station function are limited
- Construction staging difficulties reduce dollar value of improvements
- Station remains isolated on island
- Traffic and pedestrian access at intersection remains problematic
- Bridge and remote headhouse elements “clutter” the intersection and environs
- Bridge options double the number of elevators required to produce ADA compliance
- Connections to future Blue Line requires construction of major lengths of tunnel on Cambridge Street

Option A1.2 is a major redesign of the station on the existing site. An enlarged station is approached from the perimeter of Charles Circle from new headhouses at the north and south sides. The station incorporates stairs, elevators and up escalators to the platform, while the side headhouses include stairs and elevators, satisfying the ADA access. Connecting the headhouses to the main station are new glass enclosed, truss-type pedestrian bridges, which not only clear the traffic below, but also ramp down to the existing mezzanine level, where the pay plaza is located.

Potential landscaping for the station would incorporate larger landing areas at either headhouse, carrying through the Beacon Hill brick sidewalk paving, street trees and revised parking patterns, especially at the south side of the Circle. Roadway changes would be minimal, however, a distinct at-grade pedestrian path across Cambridge Street from north to south could be included. The north headhouse could be incorporated in the future Charles Street Jail development, currently in the planning stages.

The station would occupy a footprint approximately 10-15% greater than the current station. The overhead walkways are oriented farther to the east; these would still allow pedestrians to cross the intersection by using an above grade passageway through the station.

The Ground level plan is limited to support spaces for the station and the MBTA personnel. Mezzanine level is the landing level for the pedestrian bridges, where the free and the pay plaza lead to the vertical circulation elements, up escalator, elevator and stair to the inbound and outbound platforms above. The platforms are slightly enlarged to accommodate the additional circulation from below.

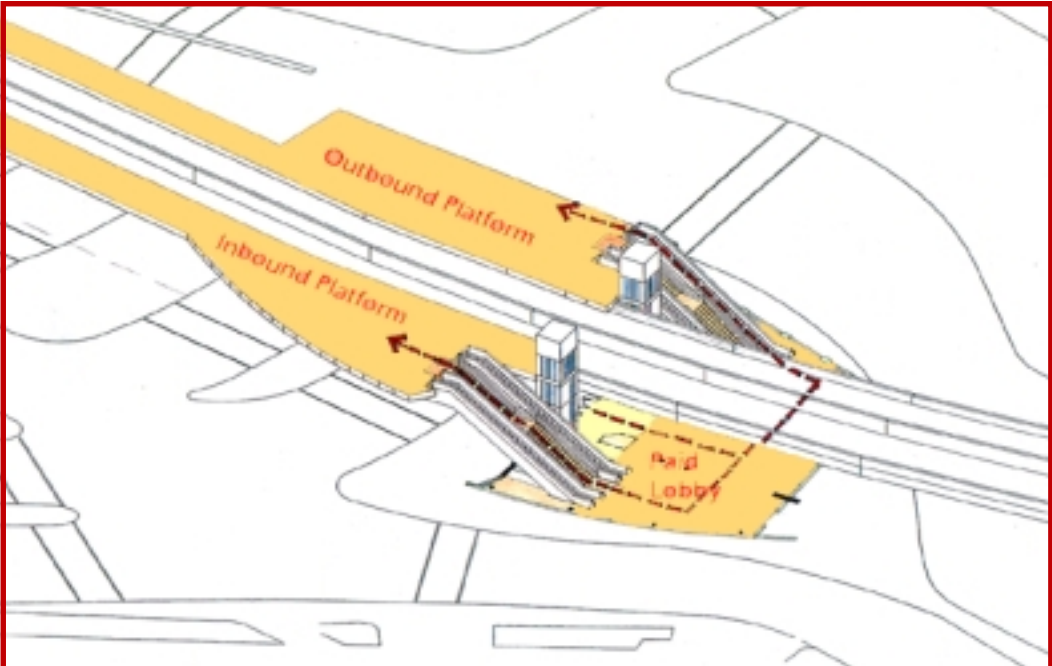
Similar in concept to the present station, a new station would be more open, modern and secure than the existing. The station would satisfy the ADA requirements. Its drawbacks, however, resemble the present ones: low headroom at the mezzanine below the track girders and remote pedestrian access to the middle of the traffic circle.

Option B2.0

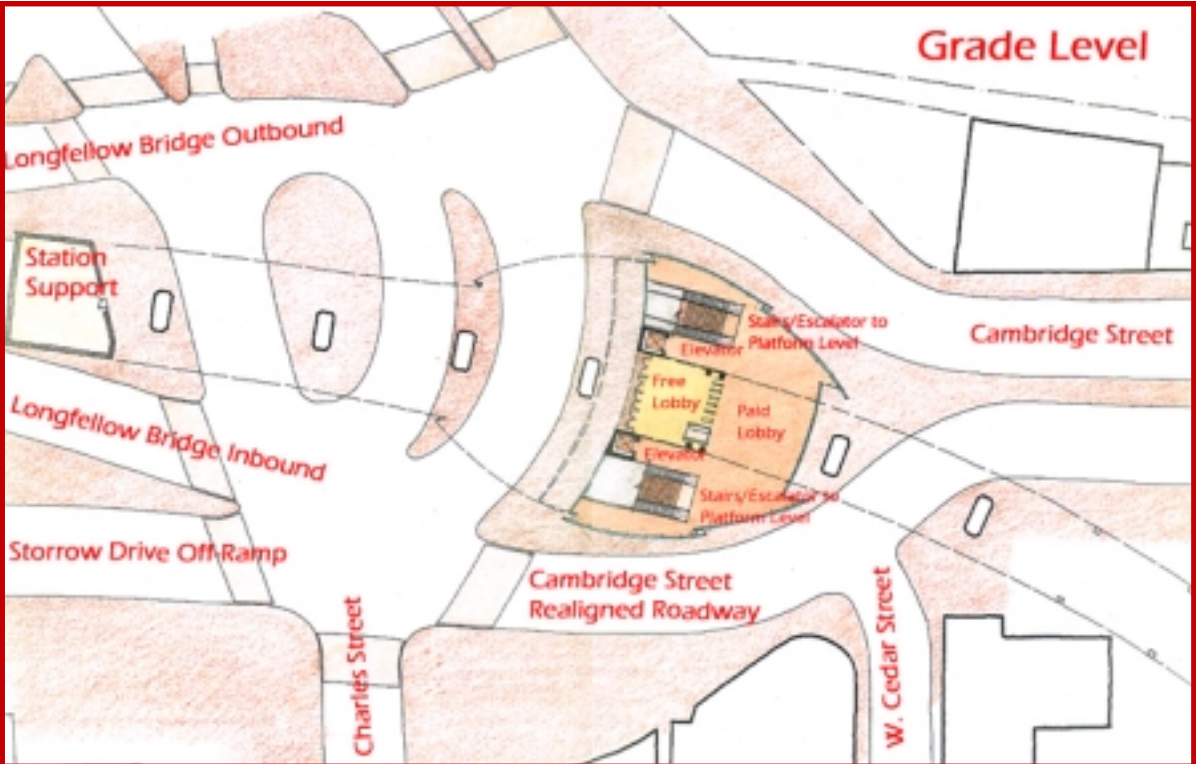
New station
at enlarged
Cambridge Street
island with
at-grade access



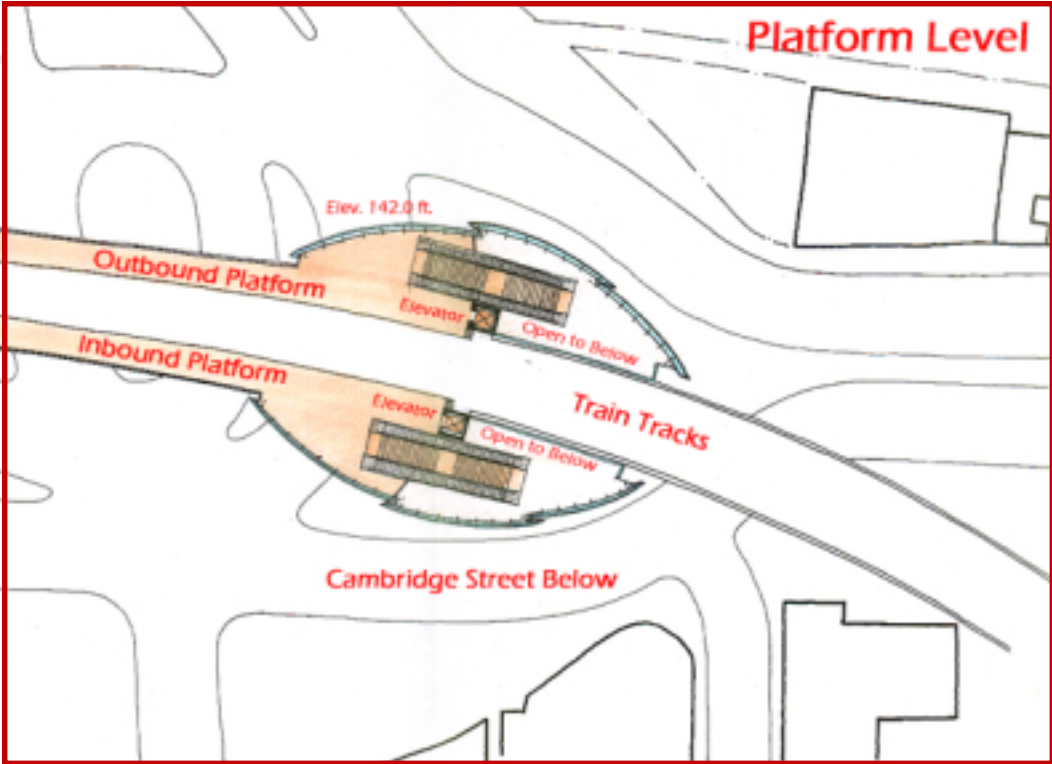
Landscape Plan



Station Isometric Plan



Station Plan - Ground Level



Station Plan - Platform Level

Evaluation

Option B2.0
Project Alternative

PROS

- Location of station and pedestrian desire lines for crossing the intersection are the same
- At grade entry most logical circulation path
- At grade pay plaza reduces number of elevators required to meet ADA compliance
- Station location is now part of urban fabric vs. isolated island
- Station elements can be constructed while existing station remains in operation
- Expanded site allows station program elements to be sized to accommodate increased usage by MGH and neighborhood
- Track modifications are not required
- Station location provides setting for strong “millennium” image
- Connections to future Blue Line extension are direct and limit need for redundant construction

CONS

- Site requires traffic modifications to intersection
- Requires reconstruction of Storrow Drive off-ramp
- Station is still in the middle of the street
- Traffic phasing is required to keep existing headhouse operational during construction
- Pier reconstruction needed at station

Option B2.0 considers a redesigned traffic scheme for Charles Circle as its starting point. By revising traffic patterns at this busy intersection/rotary, an enlarged “island” can be carved out, creating the opportunity for an at-grade pedestrian crossing to the station headhouse.

Major roadway changes would add a third off-ramp lane from Storrow Drive for cars waiting to exit to Charles Circle and would relocate turning traffic in the Circle between sets of existing platform piers farther to the west.

Landscape opportunities could further define the separation between cars and pedestrians. These could take the form of enlarged and distinctly paved street corners and crosswalks, low walls, planters, berms, bollards, and parking separations. Pedestrians from both the north and south approaches would be able to cross the street to the new station, located on grade, in the middle of Cambridge Street.

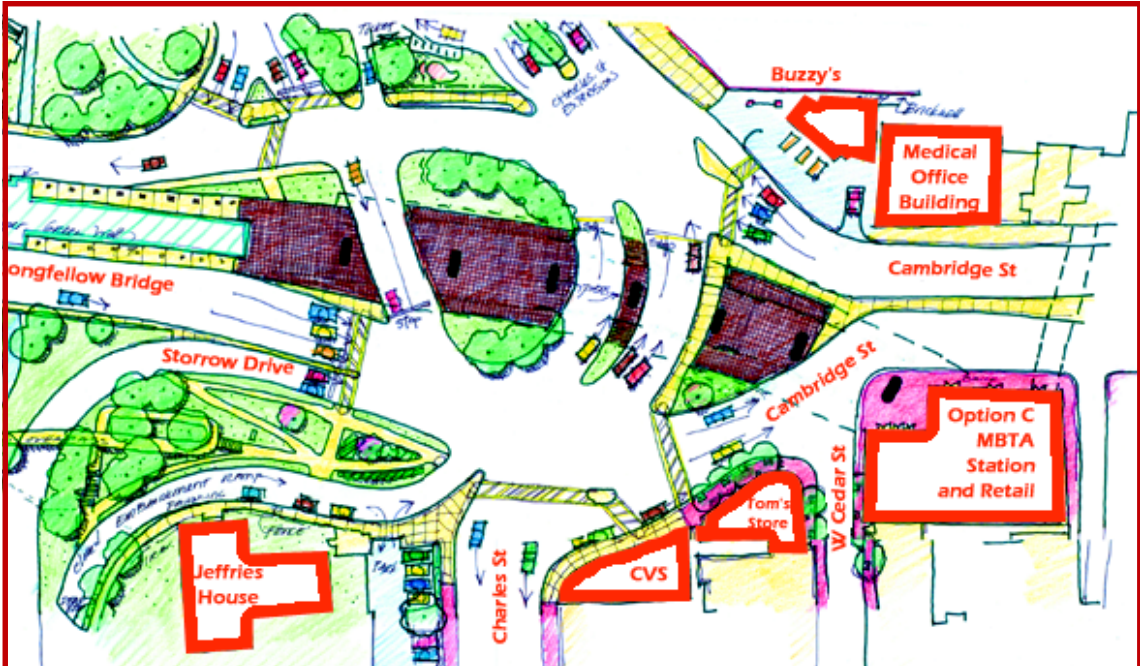
The headhouse is located farther to the east than the existing station, while the platforms are reused in their present position. The track and its supporting structure of piers and girders remain. The existing station headhouse along with its remote stairs and bridges would eventually be demolished, once a phased construction of the new station is accomplished.

At grade level, the new station incorporates the free and pay plazas. Vertical transportation elements, up and down escalators, stairs and elevators on each side, connect directly to the inbound and outbound platforms. The platform level is slightly enlarged to accommodate new circulation from below.

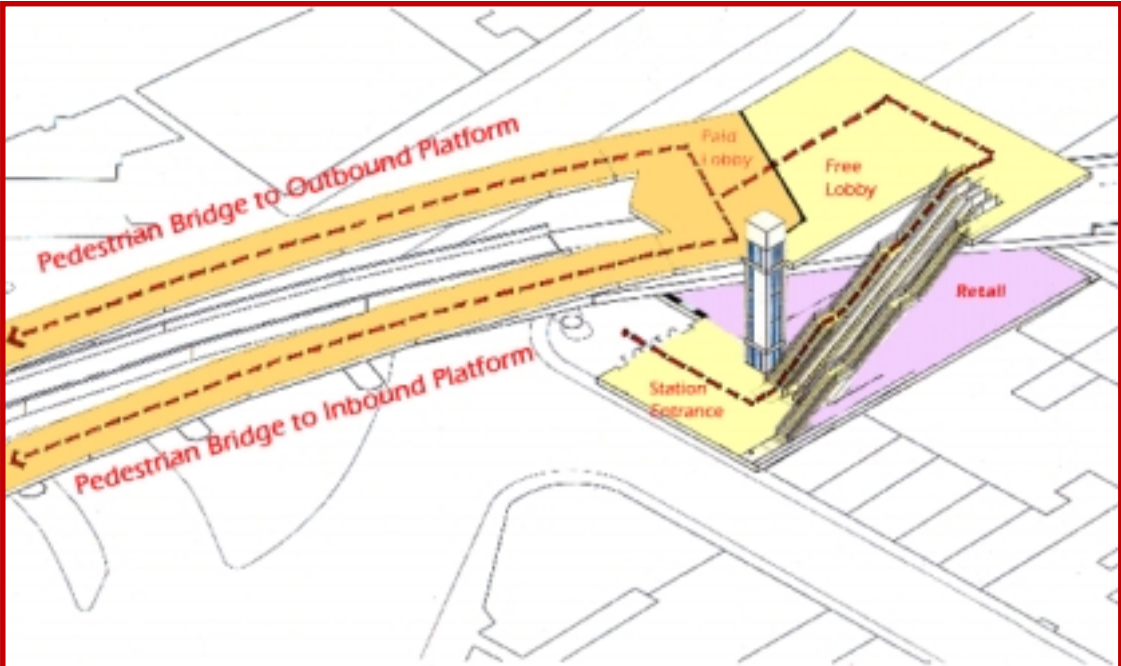
Opportunities abound for the station to become a significant form in the streetscape, a new “gateway” for the city, while satisfying the needs of MBTA riders for access, security and safety.

Option C1.2

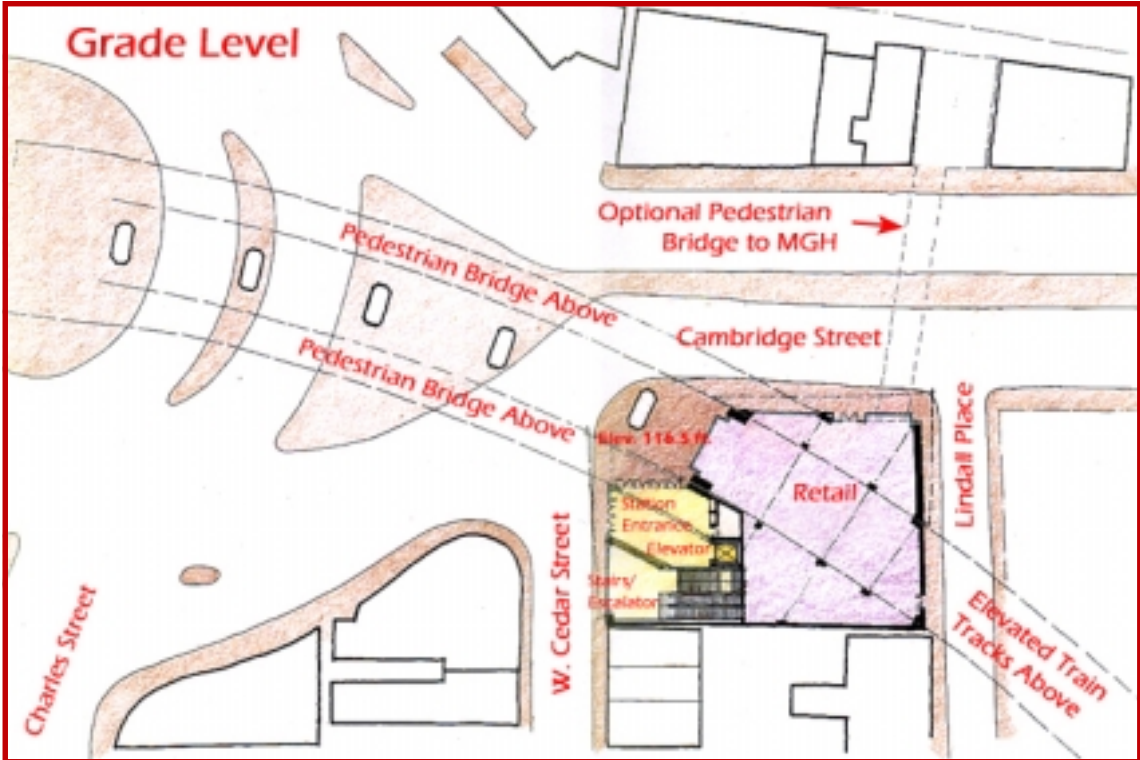
New station at
West Cedar Street
with bridge
access to
MGH/MEEI
district area



Landscape Plan



Station Isometric Plan



Station Plan - Ground Level



Station Plan - Platform Level

Evaluation

Option C1.2
Project Alternative

PROS

- Station relocation “frees” circle and bridge
- Direct connections are possible to future MGH/ MEEI campus
- Street frontage is completed along Cambridge Street replacing unused lots.
- Station becomes part of neighborhood
- No traffic modifications are required in intersection – intersection is more accepting of modification in the future without existing station island
- Form of station encloses train and in doing such reduces noise to neighborhood

CONS

- Long “walk back” distance from existing platforms to relocated station
- Cambridge Street is covered with large, possibly gloomy, 65’ wide soffit overhead
- Access path to pay plaza requires major vertical connections with escalators and elevators
- Site requires “public taking” of adjacent property
- Modifications to rail structure are required between Cambridge Street and Lindall Place
- Bridge across Cambridge Street may be objectionable to urban design of the district

Option C1.2 is presented as an opportunity to complete the Cambridge Street edge by siting the station on the lot where the elevated Red Line tracks cut through from Cambridge Street towards the portal. The empty lot fronts on Cambridge Street, between West Cedar Street and Lindall Place. A public taking of an existing building at the end of the West Cedar Street block is required. A new station at this site would address the neighborhood urban context and solve pedestrian access to the station by removing them from Charles Circle.

Roadway changes would be minimal, however, a distinct at-grade pedestrian path across Cambridge Street from north to south could be included. Brick paved sidewalks at the station would complete the Beacon Hill context.

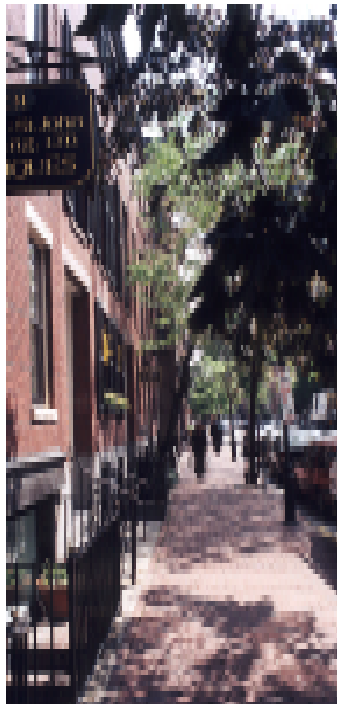
The headhouse is located much farther to the east than the existing station, while the platforms are re-used in their present position. The station location would necessitate a lengthy “walk back,” around 300 feet, toward the platforms. The track structure of piers and girders partially remain, however, the portion of track at the station site would be restructured. The existing station headhouse and the remote stairs and bridges would eventually be demolished, once a phased construction of the new station is accomplished.

At grade level, the station incorporates the entrance and vertical circulation elements, escalators, stair, and elevator, leading to the station level. Additional area at street level is available for retail use and support for the station. The free and pay plazas are designed to be above track level, approximately 36 feet above the street. From there, ramped pedestrian bridges on either side of the track structure connect to the existing platforms. An optional pedestrian bridge over Cambridge Street to the hospital district might also be considered.

While the station location satisfies urban planning issues at street level, the walk back feature and the widened overhead track viaduct might be problematic. The station could, however, be designed to fit into the neighborhood and streetscape, eliminating an unsightly gap along Cambridge Street.



Conclusion



The process used to explore the full range of options to provide barrier-free access to the MBTA's Charles/MGH Station created a focus and direction toward a solution that would meet the goals of the project, the needs of the MBTA, and respond to the desires of the community and other stakeholders involved in this project. It was critical to explore the full creative range of options to ascertain that the right solution had been reached. To support this, the MBTA and its design team carefully considered the concepts developed during the "Open Ideas Competition of Design" to broaden its reach for a creative solution at Charles/MGH Station.

Culling through the options, the MBTA and its design team, focussed on the viability of each possible solution from a number of issues including public safety, constructability, cost and opportunity for greater improvements to the Charles Circle/Beacon Hill district. The MBTA has been working closely with local community groups, Massachusetts Eye and Ear Institute and Massachusetts General Hospital throughout this effort to ensure that the selected design solution creates opportunities for the hospital area. In fact, MGH has committed to make a contribution towards financing construction of the project.

Reaffirmed by the first public meeting on Charles/MGH Station, it was also important to examine the range of design solutions from the perspective of at-grade, below grade and above grade alternatives. Looking at the various alternatives from three distinct approaches, provided an even broader view of the possibilities at Charles Circle.

An important part of this exercise to fully examine the range of options for Charles/MGH Station was the partnership developed between the MBTA, City of Boston (both the Boston Redevelopment Authority and Boston Traffic Department) and Metropolitan District Commission. At the very earliest stages, a Technical Advisory Committee was created to involve all these agencies in the process. They have reviewed the options and evaluated the impacts of the potential solutions in a collaborative manner with the MBTA and its consultant throughout this exercise. Their feedback has been invaluable and has resulted in a preferred solution that provides the greatest opportunity for improvements to the area.

At the second public meeting, the three viable options from the at-grade, above grade and below grade locations were presented for information. The overwhelming majority of those attending were in support of the at-grade solution for its simplicity and its opportunity to create a more pedestrian-friendly environment, in and around the Charles/MGH Station.

The Elkus / Manfredi Architects, Ltd./HDR Joint Venture has recommended to the MBTA that Option B2.0, the new station at an enlarged Cambridge Street Island with at-grade access provides the greatest opportunity to creatively resolve the access issues at the station and provide for a safe environment for the travelling public. It is a solution that recognizes the operational constraints on the Red Line, and is an economically sound solution. Additionally, this option is compatible with the master plan work being undertaken by MGH and will give transit patrons travelling to the hospital area a direct, barrier-free link to the hospital campus.

Index

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